

# Final Status Survey Report for EaglePicher Lenexa, Kansas

		Revision 1
Authored By:	Paul Ely, Senior Radiological Engineer	3/10/10 Date
Reviewed By:	Mike Carr, CHP, RSO	3-12-2010 Date
Reviewed By	John R. Davis, Project Manager	3/15/2010 Date
Approved By	Art Palmer, Director Health Physics & Radiological Engineering	3-/2-20/0 Date
		New Plan
		Title Change
		X Plan Revision
		Plan Rewrite
		Effective Date

#### **EXECUTIVE SUMMARY**

EaglePicher Pharmaceutical Services, Lenexa, KS (EPPS) owned and operated an approximately 24,000 square-foot pharmaceutical research and production facility located at 13605 W. 96th Terrace, Johnson, County, Lenexa, KS. The building housed an entry area, cafeteria, and office space in the front portion of the building and restricted access laboratories, as well as storage and maintenance areas in the back of the building. The facility operated as a research and production laboratory, specializing in high purity specialty chemicals for drug development. The building was constructed for this purpose in the mid-1980s and operations continued until recently when it was decided to decommission the facility. Decommissioning and closure activities at the facility were conducted to comply with the requirements of the facility's Nuclear Materials License issued by the State of Kansas Bureau of Air and Radiation.

EnergySolutions was contracted by Bionomics, Inc. as a representative of EaglePicher to provide decommissioning of the EaglePicher facility including complete demolition of the facility. EnergySolutions provided engineering and technical support to design and implement a radiological Final Status Survey (FSS) of the facility in accordance with the guidance contained in NUREG 1757 "Multi Agency Radiological Site Survey and Investigation Manual" (MARSSIM). This included fixed and removable measurements on structural surfaces of the building including walls, floor and ceilings and roof. Portions of the facility were shipped to a radioactive disposal facility based on a prior characterization of the facility (Reference 6.1). The portions of the facility shipped to a radioactive disposal facility were not included in the FSS as they were not being released. The portion of the building released by the FSS was shipped to a local CD industrial landfill for disposal. The maximum estimated total activity released to the landfill was less than 9.7x10<sup>7</sup> pCi or 4.5x10<sup>-2</sup> pCi/g (2.4x10<sup>-2</sup> pCi/g H-3 and 2.1x10<sup>-2</sup> pCi/g C-14). Additional information on the activity estimate is provided in Attachment 7.5.

An estimated dose to the general public was generated based on airborne C-14 activity measured at four locations surrounding the site during building demolition activities. There was no direct exposure component to the dose as there were no radionuclides remaining on site that could contribute to a dose at the site border. The maximum exposure to a member of the public from airborne activity if they stood at the site boundary during the entire demolition process would have been 0.0013 millirem.

The overall survey performed by EnergySolutions included 384 fixed point beta measurements obtained on interior building surfaces along with 111 fixed point measurements on the exterior building surfaces. Survey areas were also scanned for beta activity and the maximum activity recorded.

In addition, 493 removable activity beta activity measurements were obtained on building surfaces.

A summary of the building survey data is provided below in Table 1. The detailed results are provided in Section 4 of this report.

**Table 1: Final Status Survey Results Summary** 

		B	Beta Fixed Point M	leasurements		H-3 Smear	s		C-14 Smear	s
Survey Unit	Location	No.	Average dpm/100 cm <sup>2</sup>	Max dpm/100 cm²	No.	Average dpm/100 cm <sup>2</sup>	Max dpm/100 cm <sup>2</sup>	No.	Average dpm/100 cm <sup>2</sup>	Max dpm/100 cm <sup>2</sup>
001	West Building	101	2,082	47,560	99	10.9	89.4	99	9.7	67.8
002	East Building	120	263	7,996	120	3.1	23.5	120	5.6	33.9
003	Exterior Walls	40	2,343	3,310	40	6.8	28.1	40	1.8	16.9
004	High Roof	28	3,105	7,200	28	9.2	46.0	28	4.3	22.3
005	Low Roof	30	1,729	2,758	30	3.0	71.2	30	2.7	11.9
006	Mezzanine Ceiling	30	3,478	9,210	30	16.2	37.5	30	16.6	127.9
007	Out Building	34	1,548	4,658	34	8.5	61.5	34	5.9	49.4
009B	Remaining Drain Pipe	2	5,510	5,510	2	706.5	796.0	2	181.0	191.0
010	Mechanical Room Floor	21	11,283	31,874	21	84.9	240.3	21	84.1	164.5
011	Stairwell to Mezzanine	41	23,977	47,817	41	56.1	144.8	41	42.9	177.0
012	West Hallway	18	5,163	15,645	18	13.3	62.5	18	12.5	46.5
013	Mezzanine Walls	30	19,252	35,566	30	21.9	114.8	30	32.9	96.5
	All Measurements	495	1,275	47,817	493	5.8	796	493	5.3	191
	Limits		60,000	60,000		6,000	6,000		6,000	6,000
			Gamma Measu	irements		H-3 Soil Resu	ılts		C-14 Soil Resu	ılts
Survey Unit	Location	No.	Gamma µR/hr	Max Gamma μR/hr	No.	Average pCi/g	Max pCi/g	No.	Average pCi/g	Max pCi/g
008	Pavement	16	7.3	8.5						
009	Soil	31	10.5	11.9	34	1.4	15.1	34	2.6	13.6
009B	Drain Pipe Trench Soil	9	9.0	9.4	10	20.6	112.0	10	1.8	24.0
	Limits					2,100	2,100		60	60

#### **Table of Contents**

Secti	on			Page
1.0	PRO	PERT	TY DESCRIPTION	6
2.0	REL	EASE	CRITERIA	8
3.0	FINA	AL ST	ATUS SURVEY DESIGN	8
	3.1	Sur	vey Units	8
	3.2	Inst	ruments	9
	3.3	Inst	rument Calibration	9
	3.4	Res	ponse Checks and Radioactive Sources	10
	3.5	Sur	vey Procedures	10
	3.6	Min	nimum Detectable Concentration (MDC) Calculations	11
	3.7	San	nple Size and Location Determination	12
	3.8	Sur	vey Instructions	13
4.0	FINA	AL ST	TATUS SURVEY RESULTS	14
	4.1	Dat	a Reduction and Evaluation	14
	4.2	Res	ults Summary	15
	4.3	Res	ults by Survey Unit	17
	4	.3.1	SU001- West Building	17
	4	.3.2	SU002-East Building	47
	4	.3.3	SU003-Exterior Walls	80
	4	.3.4	SU004-High Roof	93
	4	.3.5	SU005-Low Roof	105
	4	.3.6	SU006-Mezzanine Ceiling	117
	4	.3.7	SU007-Out Building	128
	4	.3.8	SU008-Paved Areas	140
	4	.3.9	SU009-Soil Areas	147
	4	.3.10	SU009B- Removed Drain Line and Related Site Soil Area	162
	4	.3.11	SU010-Mechanical Room Floor	173
	4	.3.11	SU011-Mezzanine Stairwell	187
	4	.3.12	SU012-West Hallway	200
	4	.3.13	SU013-Mezzanine Walls	211
5.0	QUA	LITY	ASSURANCE AND QUALITY CONTROL	226
	5.1	Sele	ection of Personnel.	226
	5.2	Wri	tten Procedures	226

		s Survey Report cher, Lenexa, Kansas	CS-HP-PN-018 Revision 1
	5.3	Instrumentation Selection, Calibration, and Operation	226
	5.4	Survey Documentation	226
	5.5	Records Management	226
6.0	REF	ERENCES	227
7.0	ATT	ACHMENTS	227

#### 1.0 PROPERTY DESCRIPTION

The site is shown in Figure 1 and the layout of the main building is shown in Figure 2. The main building on the property was one story with a partial mezzanine. It was slab and cinderblock construction with brick veneer and aluminum frame windows and doors. The roof was composed of asphalt and gravel. The first floor, 24,830 ft², was divided into office spaces and laboratories. The office areas, 16,728 ft², were mainly composed of wallboard walls, carpeted floors, and a drop ceiling. A tile linoleum floor was in the transitional space dividing the office areas and the laboratory areas in the center of the building. Common walls between the office spaces and the laboratory areas were composed of cinderblock. Floors in the laboratories were composed of sheet linoleum with cove base. Drop ceilings were present in all rooms with the exception of shipping and receiving, which has a high bay ceiling composed of metal girders and corrugated sheet metal.

The mezzanine, 7,571 ft<sup>2</sup>, was located above the west half of the building. It was constructed of cement floor, metal girders, and corrugated sheet metal ceiling. The mezzanine contained numerous linear feet of air and effluent sampling tubing (copper and Tygon), exhaust ductwork and fans, and insulated air supply ductwork.

Laboratory areas occupied 6,254 ft<sup>2</sup> on the west half of the first floor of the building and were designated as Laboratories A through F, NMR Laboratory, and GMP Laboratories 1 and 2.



Figure 1: EaglePicher Lenexa Facility

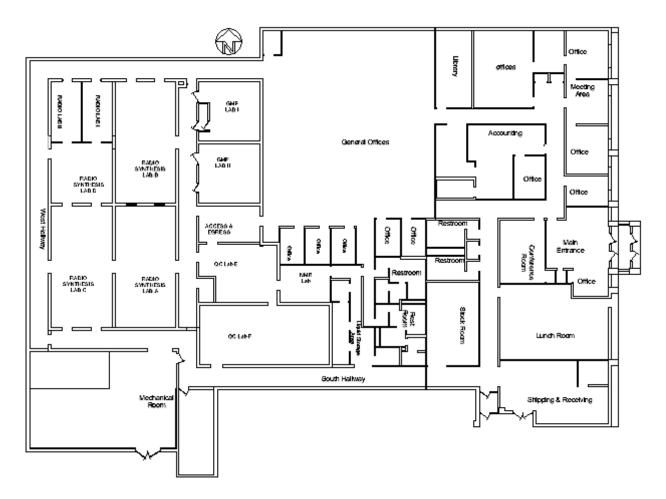


Figure 2: Building Layout

#### 2.0 RELEASE CRITERIA

The unrestricted release criteria as agreed upon with the Kansas Department of Health and Environment are presented in the Table 2-1 below.

**Table 2-1 Building Surface DCGLs** 

Radionuclide	DCGL (dpm/100 cm <sup>2</sup> )
Total C-14	60,000
Removable C-14	6,000
Removable H-3	6,000
Radionuclide	DCGL (pCi/g)
C-14	60
H-3	2,100

#### 3.0 FINAL STATUS SURVEY DESIGN

Energy *Solutions* (ES) performed the FSS scope under its NRC license (Reference 6.12, and Reference 6.13) using Energy *Solutions* approved procedures (Attachment 7.1).

#### 3.1 **Survey Units**

Survey areas included laboratory rooms, office areas and roofs of the main building. A list of the survey units is provided below in Table 3-1 and the survey packages are presented with the survey results in Section 4 of this report.

**Table 3-1 Survey Units** 

Survey Unit	Location	Area	Class
001	West Building Area	Floor, Walls & Ceiling	3
002	East Building Area	Floor, Walls & Ceiling	3
003	Outside Walls	Walls	3
004	High Roof	Roof	1
005	Low Roof	Roof	3
006	Mezzanine Ceiling	Ceiling	3
007	Out Building	Floor, Walls, Ceiling & Roof	3
008	Paved Areas	Pavement	3
009	Soil Areas	Soil	3
010	Mechanical Room	Floor	1
011	Mezzanine Stairwell	Floor & Steps	1
012	West Hallway	Floor	1
013	Mezzanine Walls	Walls	2

#### 3.2 **Instruments**

Radiation detection and measurement instrumentation were selected based on the type and quantity of radiation to be measured. The instruments used for direct measurements were capable of detecting the radiation of concern to a MDC of at least 50% of the applicable DCGL values or less. The instrumentation used for the FSS are listed in Table 3-2.

The primary survey instrument used was the Ludlum Model 2350-1 Data Logger with Ludlum 43-68 gas flow proportional detector for surface scans and direct measurements of total beta activity. The Data Logger is a portable microprocessor computer based counting instrument capable of operation with NaI gamma scintillation, gas-flow proportional, GM, and ZnS scintillation detectors. The Data Logger is capable of retaining in memory the survey results and instrument/detector parameters for up to 1,000 measurements. Direct measurement data for total beta activity was then downloaded to a computer for subsequent reporting and analysis.

Removable surface activity measurements were analyzed using a Packard Tri-Carb.

Instrument / Detector	<b>Detector Type</b>	Radiation Detected	Calibration Source	Use
Ludlum Model 2350/43-68	Gas-flow proportional (126 cm <sup>2</sup> )	beta	<sup>14</sup> C (β)	Beta scans & direct measurements
Ludlum Model 2350/44-10	2" × 2" NaI scintillator	gamma	<sup>137</sup> Cs (γ)	Gamma radiation scans & direct measurements
Packard Tri-Carb 2900TR	Liquid Scintillation	beta	<sup>3</sup> H (β) <sup>14</sup> C (β)	Smear counting

**Table 3-2: Survey Instrumentation** 

#### 3.3 **Instrument Calibration**

Survey instruments, counting devices, and other equipment used for radioactivity detection and measurement were cared for and maintained as discussed in CS-FO-PR-002 "Calibration and Maintenance of Radiological Survey and Sampling Equipment Procedure," (Listed in Attachment 7.1).

Energy Solutions calibrated the instruments and associated detectors on a semiannual basis using National Institute of Standards and Technology (NIST) traceable sources and industry standard calibration equipment.

The instrument calibration included:

- high voltage calibration,
- discriminator/threshold calibration,
- window calibration,

- alarm operation verification, and
- scaler calibration verification.

The detector calibration includes:

- operating voltage determination,
- calibration constant determination, and
- dead time correction determination.

Calibration labels showing the instrument identification number, calibration date, and calibration due date were attached to all portable field instruments.

Calibration certificates for instruments used in the FSS are included in Attachment 7.2.

#### 3.4 Response Checks and Radioactive Sources

Prior to use on-site, all project instrument calibrations were verified and initial response data collected. These initial measurements were used to establish instrument control charts and performance standards (response ranges) in which the instruments were tested against on a daily basis when in use as discussed in CS-FO-PR-004, "QA/QC of Portable Radiological Survey Instruments," (Listed in Attachment 7.1). The Packard Tri-Carb was not controlled under this procedure. The Tri-Carb software had a built in requirement for daily source checks which were automatically included in the internal control charts.

The daily response tests results were documented and compared to these operating parameters and ranges in the control charts to ensure that the instrumentation was functioning properly.

#### 3.5 **Survey Procedures**

Energy *Solutions* performed surveys according to procedures (Attachment 7.1), and survey packages. The procedures identified survey instrument requirements, calibration, measurement and sample collection. The FSS included the following:

- Survey personnel collected smear samples and measurements with the results analyzed and/or calculated as defined in the survey packages.
- Direct field measurements and scan surveys were performed using appropriately calibrated instruments as per CS-FO-PR-002 (Attachment 7.1).
- Daily instrument quality control (QC) checks were performed before and after each day's work and as outlined in CS-FO-PR-004 (Attachment 7.1).
- Survey personnel marked and/or detailed on a survey map the sample and measurement locations to ensure reference back to a sample or measurement.
- All instrument logged data was be downloaded from the survey instrument into a database for storage, analysis, and reporting on a daily basis.
- All sample and measurement results were evaluated by the Energy *Solutions* Survey Manager.

#### 3.6 Minimum Detectable Concentration (MDC) Calculations

#### 3.6.1 Static Measurements for Total Beta Surface Activity

The MDC is defined as the smallest concentration of radioactive material in a sample that will yield a net positive count with a 5% probability of falsely interpreting background responses as true activity and a 95 % probability of correctly interpreting activity above background as true activity. The MDC is dependent upon the counting time, geometry, sample size, detector efficiency, and background count rate. The equation used for calculating the MDC, in dpm/100 cm², for total surface activity is:

$$MDC = \frac{\frac{2.71}{t_s} + 3.29\sqrt{\frac{R_B}{t_s} + \frac{R_B}{t_B}}}{(\varepsilon_i)(\varepsilon_s)\left(\frac{A}{100 \ cm^2}\right)}$$
(Equation 3-1)

where:

 $R_B = background count rate (counts per minute [cpm])$ 

 $t_s$  = sample count time (min)

t<sub>B</sub> = background count time (min)

 $\varepsilon_s$  = surface efficiency (determined using ISO-7503)

 $\varepsilon_i = 2\pi$  instrument efficiency

A = detector area (cm<sup>2</sup>)

Instrument efficiencies and MDC are included along with detailed survey results in Section 4 of this report.

#### 3.6.2 <u>Removable Surface Activity</u>

The Packard Tri-Carb report did not include MDC values. However the detection limit of any measurement device is determined by the signal to noise ratio. In Liquid Scintillation Counting (LSC) this signal to noise ration is expressed as a function of counting efficiency (E) and background contribution (B) and is known as the Figure-of-Merit (FOM) and is calculated during daily calibration runs. The FOM equation is:

$$FOM = E^2/B$$
 (Equation 3-2)

where:

E = counting efficiency for the radionuclide of interest [%]

B = background count rate (counts per minute [cpm])

According to the manufacturer of the Tri-Carb, FOM's for H-3 are typical about 180 and for C-14 are about 380 with larger values indicating a better signal to noise ratio. The FOM values observed during this FSS averaged  $245 \pm 9$  for H-3 and  $492 \pm 20$  for C-14.

#### 3.6.3 Scan Surveys

In the case of the scan measurements, the counting interval is the time the probe is over a specific source of radioactivity. This time depends upon the scan speed, the size of the source, and the fraction of the detector's sensitive area that passes over the source; with the latter depending on the direction of probe travel. The scan speed is typically one probe width per second so the observation interval is 1 second.

The scan MDC for beta scanning where there are elevated beta count rates (i.e., >500 cpm), the MDC is determined using the Equation 3-3. The MDC equation is as follows:

$$MDC_{Scan} = \frac{d'*\sqrt{b_i} * \frac{60}{i}}{\sqrt{p} * \varepsilon_i * \varepsilon_s * \frac{A}{100}}$$
 (Equation 3-3)

Where:

d' = Decision error taken from Table 6-5 of MARSSIM

b<sub>i</sub> = Background counts per observation interval

i = Observation counting interval in seconds (detector

width divided by the scan speed)

p = Surveyor Efficiency (typically 50%)

A = Detector Area (cm<sup>2</sup>)

#### 3.7 Sample Size and Location Determination

No material-specific background corrections for buildings were performed for total beta measurements except for the bare concrete walls in the mezzanine area.

#### Reference Coordinate System

A reference coordinate system was established for each survey unit. Survey locations were referenced to the southwest corner of each survey unit and survey locations were marked on the floor or wall surface. Survey maps were generated that indicated the location of grids and soil sampling locations.

Random survey patterns were used for Class 3 areas and gridded data point locations were used for Class 1 and Class 2 areas. In some Class 3 areas however, a 1-meter grid pattern was utilized with each grid assigned a number and the grid numbers randomly selected for survey. This method was utilized when the shape survey unit was not regular such as "L" shaped, "U" shaped or rectangular with odd shaped appendages.

The survey protocol included locating survey points relative to mapped floor locations. The ceiling locations were directly above the floor locations. The wall locations were on the nearest wall from the floor location and they alternated elevations between 3-ft and 7-ft above the floor. These locations were marked on floors and walls prior to surveys being performed.

The minimum number of measurement and sampling locations were determined using the COMPASS code and these results are identified in Table 3-3 below along with the number of measurements obtained during the Final Status Survey. The COMPASS results are included along with survey location calculations in Attachment 7.5.

**Table 3-3: Survey Measurement Requirements** 

a				Survey	Locations	
Survey Unit	Location	Area	Class	Min	FSS Actual	Scan
001	West Building	Floor, Walls & Ceiling	3	14	101	10-25%
002	East Building	Floor, Walls & Ceiling	3	13	120	10-25%
003	Outside Wall	Walls	3	14	40	25%
004	High Roof	Roof	2	14	28	25%
005	Low Roof	Roof	3	14	30	25%
006	Mezzanine Ceiling	Ceiling	3	14	30	10%
007	Out Building	Floor, Walls, Ceiling & Roof	3	14	34	10-25%
008	Paved Areas	Pavement	3	14	16	10%
009	Soil Areas	Soil	3	22	31	10-100%
009B	Outdoor Areas	Remaining Drain Pipe & Soil	3	9	9	0%
010	Mechanical Room	Floor	1	15	21	100%
011	Mezzanine Stairwell	Floor	1	15	41	100%
012	West Hallway	Floor	1	15	18	100%
013	Mezzanine Walls	Walls	2	28	30	25%

#### 3.8 **Survey Instructions**

In general, the survey units contained the following survey elements:

- Beta scan surveys in all areas, with a 100% scan in Class 1 areas and a 10 to 25% scan in Class 2 and Class 3 areas.
- Systematic direct beta measurements were obtained from floors walls and ceilings in Class 1 and Class 2 areas and random direct beta measurements were obtained from floors walls and ceilings in Class 3 areas. Drop ceilings were removed prior to performing the FSS to allow direct access to the underside of the corrugated metal roofing material.
- Systematic beta removable activity (smear) measurements were obtained from all floors walls and ceilings at the same locations where fixed measurement readings were obtained.

#### 4.0 FINAL STATUS SURVEY RESULTS

#### 4.1 Data Reduction and Evaluation

Direct measurements were obtained for total beta surface activity using the Ludlum Model 2350-1 Data Logger system. Upon completion of a survey, the contents of the Data Logger's memory were downloaded into a database that converts counts into dpm/100 cm² and generates survey reports. The data base was loaded with information about the project and survey instrumentation prior to the performance of the FSS. This information included site identification, survey technician names and identification, Ludlum 2350-1 serial numbers with calibration dates, detector types with serial numbers, detector area, radiation detected, efficiencies and calibration dates. During the performance of surveys the EaglePicher site was selected along with the technician performing the surveys, survey instrument, specific detector used, type of survey, radiation type and survey date. The data base then verified that the instrument and detector calibration was current and applied the correct backgrounds, count rates, detector surface areas and calibration information to generate survey reports in terms of dpm/100 cm².

After the survey reports were complete they were reviewed for completeness and accuracy by the survey technician. This technician review includes the following:

- Survey description is correct and complete and in clear English
- Survey measurement type is correct
- User ID is correct and technician name is also correct
- Instrument model, serial number, and cal due date are correct
- Detector model, serial number, type, and detector calibration due date are correct
- Detector efficiency is correct and survey location codes are correct

The completed survey reports were inserted in the survey package that typically includes the following items:

- Survey Package Worksheet. The worksheet was also reviewed for completeness and accuracy by the survey technicians and the survey manager and includes Survey Maps
- Beta Fixed Point Survey Reports
- Smear Survey Reports, and

Data and document control included the maintenance of the raw data files, translated data files, and documentation of corrections made to the data. The data files were backed up on a daily basis.

#### 4.2 Results Summary

The overall survey performed by EnergySolutions included 503 fixed point beta measurements obtained on building surfaces. Survey areas were also scanned for beta activity and the maximum activity recorded.

In addition, 493 removable beta activity measurements were obtained on building surfaces.

Gamma scans and gamma fixed measurements were performed on outdoor paved areas

Site soil areas including the area beneath the building floor slab were surveyed and sampled. Surveys were made using a 2" by 2" NaI detector and the survey activity recorded. Note that C-14 and H-3 cannot be detected using a gamma survey instrument, these surveys were performed to demonstrate that only background levels of gamma emitting radionuclides were on site. Surface samples (~0 to 6-in deep) were obtained based on random survey locations. Soil sample results are provided in section 4.3.9 "SU009-Soil Areas" of this report.

Table 4-1 below provides a summary of the survey data. Detailed results are provided by survey package in the sections of the report that follow.

**Table 4-1 Survey Results Summary** 

				Tuble 4 1 bt	ii vey i	Lesuits Suilli	iiai y			
		F	eta Fixed Point M	leasurements		H-3 Smear	s		C-14 Smear	s
Survey Unit	Location	No.	Average dpm/100 cm <sup>2</sup>	Max dpm/100 cm²	No.	Average dpm/100 cm <sup>2</sup>	Max dpm/100 cm²	No.	Average dpm/100 cm²	Max dpm/100 cm²
001	West Building	101	2,082	47,560	99	10.9	89.4	99	9.7	67.8
002	East Building	120	263	7,996	120	3.1	23.5	120	5.6	33.9
003	Exterior Walls	40	2,343	3,310	40	6.8	28.1	40	1.8	16.9
004	High Roof	28	3,105	7,200	28	9.2	46.0	28	4.3	22.3
005	Low Roof	30	1,729	2,758	30	3.0	71.2	30	2.7	11.9
006	Mezzanine Ceiling	30	3,478	9,210	30	16.2	37.5	30	16.6	127.9
007	Out Building	34	1,548	4,658	34	8.5	61.5	34	5.9	49.4
009B	Remaining Drain Pipe	2	5,510	5,510	2	706.5	796.0	2	181.0	191.0
010	Mechanical Room Floor	21	11,283	31,874	21	84.9	240.3	21	84.1	164.5
011	Stairwell to Mezzanine	41	23,977	47,817	41	56.1	144.8	41	42.9	177.0
012	West Hallway	19	6,073	28,742	18	13.3	62.5	18	12.5	46.5
013	Mezzanine Walls	30	19,252	35,566	30	21.9	114.8	30	32.9	96.5
	All Measurements	495	1,275	47,817	493	5.8	796	493	5.3	191
	Limits		60,000	60,000		6,000	6,000		6,000	6,000
			Gamma Measu	irements		H-3 Soil Resu	ılts		C-14 Soil Resu	ılts
Survey Unit	Location	No.	Gamma µR/hr	Max Gamma μR/hr /hr	No.	Average pCi/g	Max pCi/g	No.	Average pCi/g	Max pCi/g
008	Pavement	16	7.3	8.5						
009	Soil	31	10.5	11.9	34	1.4	15.1	34	2.6	13.6
009B	Drain Pipe Trench Soil	9	9.0	9.4	10	20.6	112.0	10	1.8	24.0
	Limits					2,100	2,100		60	60

#### 4.3 Results by Survey Unit

The survey results for each survey unit include a Summary Results Table, a Survey Package with maps, Results Tables and Charts, the 2350-1 Download Data tables and Charts and the Smear Results Data.

#### 4.3.1 SU001- West Building

This was initially all a Class 3 survey unit. Initial surveys revealed some areas with activity close to or in excess of the release limit. Some areas were remediated and reclassified as Class 1 and some areas were only reclassified.

The Machine Room floor had some areas in excess of limits (60,000 dpm/100 cm<sup>2</sup>). Most of these areas were decontaminated and the Machine Room floor was changed to a Class 1 area (SU010) and resurveyed. One area of the floor was removed as radioactive waste and this area was removed from the Final Status Survey (FSS).

The Mezzanine Stairwell floor and steps had some areas in excess of limits (60,000 dpm/100 cm<sup>2</sup>). The floor and steps were decontaminated and the area resurveyed as a Class 1 area SU011).

The West Hallway floor had some areas in excess of limits (60,000 dpm/100 cm<sup>2</sup>). The remaining linoleum was removed and the floor cleaned. One small area on the floor still exceeded limits. The West Hallway floor was changed to a Class 1 area (SU012) and resurveyed. In addition the painted block walls were also contaminated from the floor up to the ceiling. The walls and a part of the floor were removed as radioactive waste and not included in the Final Status Survey (FSS).

Summary results are provided in Table 4-2 which is followed by the Survey Package Worksheet, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

**Table 4-2 SU001 Summary Results** 

Summary	Beta	Beta Scan		
Survey Unit 001	Fixed Reading	Maximums	H-3 Smear	C-14 Smear
West Building, Class 3	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )
Number	101	5	99	99
Average	2,082	20,646	11	10
Standard Deviation	5,893	N/A	14	11
Maximum	47,560	47,560	89	68



#### FSS Survey Package Worksheet for EaglePicher SU001

Package Identification No.: SU01F/SU01S	Prepared by: Paul C. Ely
Location: Building West Interior	Date Prepared: 9/30/2009
Area Classification: Class 3	Signature: Paul Ely

#### Area Description

The survey area includes the floor, walls and ceiling.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

#### **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - $\varepsilon_t$ , the total beta efficiency =  $\varepsilon_i * \varepsilon_s$
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 25% scan of floor and lower walls (6-feet and below), for beta contamination and 10% scan of upper walls and ceiling for beta contamination.
- 3. Perform direct beta surface activity measurements at each measurement location. All ceiling surveys locations are directly above marked floor survey locations. Wall measurement locations are determined by extending the survey grids from the floors up the walls and obtaining measurements at alternating elevations of 3-feet from the floor and 7-feet from the floor. Mark and the survey location on the walls with a felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the survey unit. Random survey locations were generated for this class 3 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm<sup>2</sup> in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Page 2 of 3

# Survey Package Worksheet SU01F/SU01S (cont'd)

# Randomly generated measurement and sampling locations are located on the attached survey map. If any location is inaccessible, offset the measurement location to the nearest usable location and mark the survey location on the map. The attached map provides floor measurement and sampling locations (ceiling and wall locations are based on floor locations). Special Instructions plastic shield on the survey surface. Log scan measurements or record maximum scan measurement results in cpm on a Grid Scan Record. The static MDC for total beta activity measurements shall be less than Perform a minimum of three one-minute field backgrounds using the Source check instrumentation to C-14 for beta measurements. 3,000 dpm/100 cm<sup>2</sup>

Ceneral   Beta   Survey   Direct   Survey   Scan   Tech   Sean   Tech   Tech	General   Beta   Survey   Direct   Survey   Su				unc	Survey Pertormance (Initial and date as each item is completed)	mance	(Initial a	nd date	as each i	tem is c	mpletec	(1			
Description   Scan Tech   Beta   Tech   Alpha   Tech   Scan Tech   Gamma   Tech   Gamma   Tech   Gamma   Tech   Gamma   Tech   Gamma   Gross   Tech   Gamma   Tech   Gamma   Tech   Gamma   Gross   Gamma   Tech   Gamma   Tech   Gamma   Gross   Gamma   Gamma   Tech   Gamma   Gross   Gamma   Tech   Gamma   Tech   Gamma   Gross   Gamma	Description   Scan   Tech   Alpha   Tech   Alpha   Tech   Scan   Tech   Gamma   Tech	Location Codes		Conorol	Doto				2				i		Smear	
Thitial   (200   Initial   (200   Init	Initial   @60   Initial   @60   Record   Recor	T.6		Description	Scan	Tech	Beta		Alpha	Survey	Scan	Survey	Direct	Survey	Gross (Liq. Scint.)	Survey
Floor   N/A   MAPLE   40   Face   Sec   Date   Sec   Sec	Floor   N/A   MAPLE   40   Respectively   N/A   MAPLE   40   Respectively   N/A   MAPLE   40   Respectively   N/A   M/A   N/A   N/						Eagle	Picher S	U001 CI	ass 3 Are	83					
Floor N/A Why E 40 Reserved N/A	Floor N/A White 40 N-8-00 N/A	O Na	terial ode			Initial & Date	990 sec	Initial & Date	@60 sec	Initial & Date		Initial & Date	@100 cm	Initial & Date	В	Initial & Date
Floor   25%   N/A   N/	Floor   25%   N/A   N/	B	2000	Floor	N/A	3N W	40	1485 P		N/A	N/A	N/A	N/A	N/A	40	11-02-69
Walls         N/A         M/A         N/A         N/A         N/A         N/A         N/A         N/A         N/A         N/A         A           Lower Wall         25% Rescaped N/A	Walls         N/A         MAPLE         40         PC-R-OF         N/A	Щ	B0002	Floor	25%	K 20 00	N/A	N/A	N'A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lower Lower Wall 25% RWS N/A	Lower 25% KMS N/A	-	B0004	Walls	N/A	MAPORE	40	5-8-9		N/A	N/A	N/A	N/A	N/A	40	1-55-09
Ceiling         N/A         M/A Mydce         40         M/A Mydce         N/A         N/A         N/A         N/A         N/A         A         40           Ceiling         10%         Ceiling         N/A         N/A         N/A         N/A         N/A         N/A         N/A	Ceiling         N/A         MAPLE         40         Miscret         N/A	ш	30004	Lower	25%	KN8-01	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
10% (So passes) N/A	Ceiling 10% @ pages N/A N/A N/A N/A N/A N/A N/A N/A N/A	-	B0012	Ceiling		NAMPLE		On Jours	N/A	N/A	N/A	N/A	N/A	N/A	40	80 m m
		-	30012	Ceiling	100	popol &	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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1.2   1.6   Description   Scan   Tech   Tech   Scan   Tech   Scan   Tech   Te	Location Code	es	,			-		i						Smear	
Survey Comments  Survey Comments  Package Review  Package Completed: 11/3/09  Survey Comments  Package Completed: 11/3/09  Survey Comments  Package Completed: 11/3/09  Survey Comments  Package Completed: 11/3/09  Included the Signature): Mand CEP 12/22/09		F.6	Description	Scan		_	Tech	Alpha	Tech	Scan		Direct	Survey	Gross (Liq. Scint.)	Survey
Survey Comments  Survey Comments  Survey Comments  Package Review  Package Completed: 1/2/09  kage Review by and Date (Signature): Machine Completed: 1/2/09															
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Survey Comments  Survey Comments  Package Review  Package Review  Package Completed: 11/2/09  Rage Review by and Date (Signature):   Author (Signature):					S 1										
Survey Comments  Package Review  Package Completed: 11/2/07  kage Review by and Date (Signature):   ALACTED 12/22/09															
Survey Comments  Package Review  Package Completed: 11/2/09  kage Review by and Date (Signature): Auch Comments															
Survey Comments  Package Review  Package Completed: 11/2/09  Rage Review by and Date (Signature): Machine 12/22/09															
Survey Comments  Package Review  Package Review  Package Completed: 11/3/09  Rage Review by and Date (Signature):   Author 12/33/09															
Package Review  Package Completed: 11/2/09  Rage Review by and Date (Signature):   Mackage Review by Bate (Signature):   Mackage Review by							Survey	Comme	nts						
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e Package Completed: 11/2/09 kage Review by and Date (Signature): Haule Egy 12/22/09							Packag	ge Revier	A						
kage Review by and Date (Signature): $f_{aul}^{(2)}(\mathcal{E}_{\mathcal{G}}}}}}}}}}$	Surveyor(s) Signatu	Mres:	Money MG	Magn	(2)	JAR	A A		do						
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	ev. 0													_	Page 3 of 3

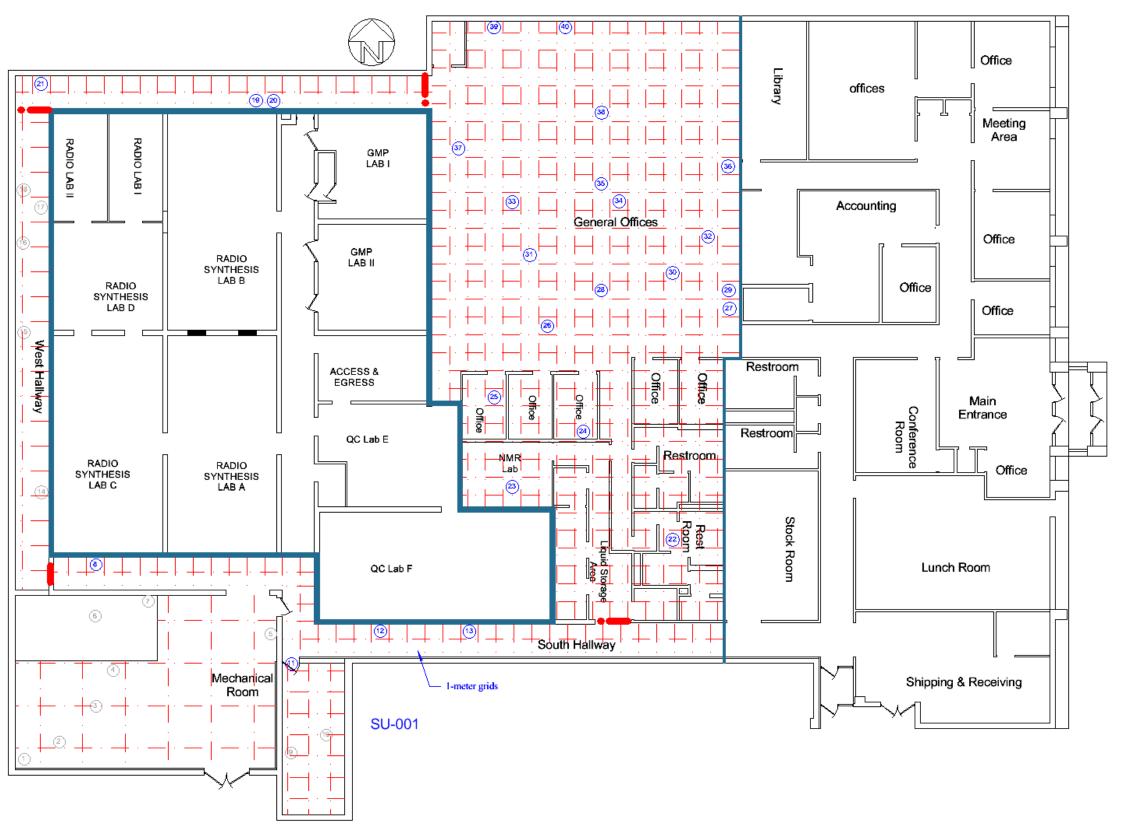


Figure 4-1 SU001 Survey Map

EaglePicher FSS Data Sheet Survey Unit 001 West Building

		Detector				
Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

			В	eta	H-3		C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )				
1	F	Floor	SU010	60,000	SU010	6,000	SU010
2	F	Floor	SU010	60,000	SU010	6,000	SU010
3	F	Floor	SU010	60,000	SU010	6,000	SU010
4	F	Floor	SU010	60,000	SU010	6,000	SU010
5	F	Floor	SU010	60,000	SU010	6,000	SU010
6	F	Floor	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
7	F	Floor	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
8	F	Floor	4,154	60,000	56.5	6,000	67.8
9	F	Floor	SU011	60,000	SU011	6,000	SU011
10	F	Floor	SU011	60,000	SU011	6,000	SU011
11	F	Floor	7,488	60,000	28.4	6,000	51.5
12	F	Floor	846	60,000	0.0	6,000	25.2
13	F	Floor	719	60,000	0.0	6,000	18.3
14	F	Floor	SU012	60,000	SU012	6,000	SU012
15	F	Floor	SU012	60,000	SU012	6,000	SU012
16	F	Floor	SU012	60,000	SU012	6,000	SU012
17	F	Floor	SU012	60,000	SU012	6,000	SU012
18	F	Floor	SU012	60,000	SU012	6,000	SU012
19	F	Floor	1,032	60,000	9.3	6,000	9.3
20	F	Floor	804	60,000	7.3	6,000	23.0
21	F	Floor	1,066	60,000	38.5	6,000	40.2
22	F	Floor	2,132	60,000	36.9	6,000	26.8
23	F	Floor	47,560	60,000	NA	6,000	NA
24	F	Floor	567	60,000	11.6	6,000	2.8
25	F	Floor	533	60,000	10.5	6,000	14.1
26	F	Floor	-313	60,000	0.0	6,000	1.6
27	F	Floor	-220	60,000	0.0	6,000	6.4
28	F	Floor	0	60,000	1.9	6,000	10.0
29	F	Floor	-330	60,000	4.9	6,000	0.0
30	F	Floor	-212	60,000	12.3	6,000	8.1
31	F	Floor	212	60,000	6.6	6,000	6.1
32	F	Floor	93	60,000	28.2	6,000	15.2
33	F	Floor	178	60,000	1.5	6,000	11.3
34	F	Floor	-305	60,000	15.5	6,000	0.0
35	F	Floor	398	60,000	13.4	6,000	16.2
36	F	Floor	-288	60,000	0.0	6,000	4.7
37	F	Floor	118	60,000	0.0	6,000	12.8
38	F	Floor	42	60,000	0.0	6,000	11.1
39	F	Floor	-203	60,000	0.0	6,000	0.0
40	F	Floor	76	60,000	5.5	6,000	8.6
Average	F	Floor	2,544		11.6		15.6
Standard Deviation	F	Floor	9,332		14.9		16.5
Maximum	F	Floor	47,560		56.5		67.8

EaglePicher FSS Data Sheet Survey Unit 001 West Building

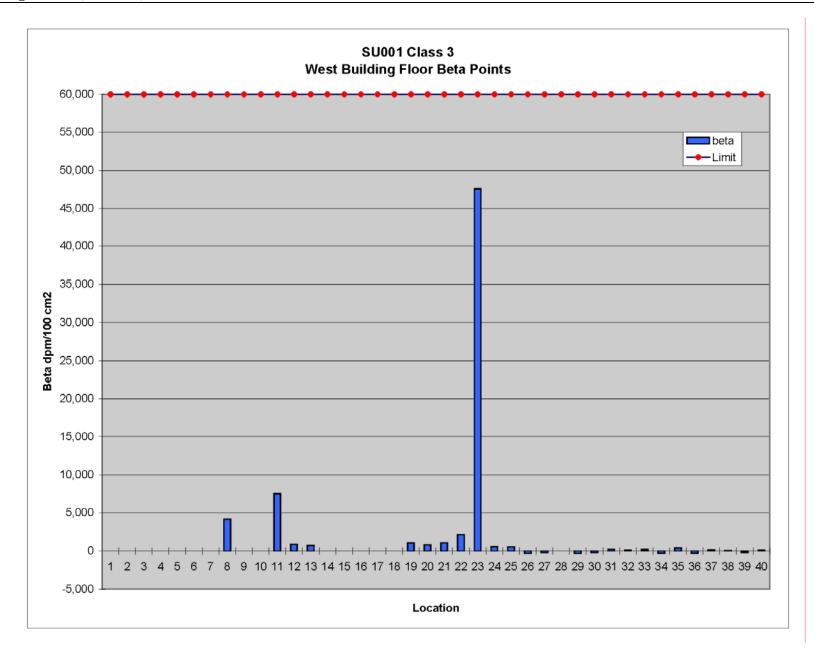
		Detector				
Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

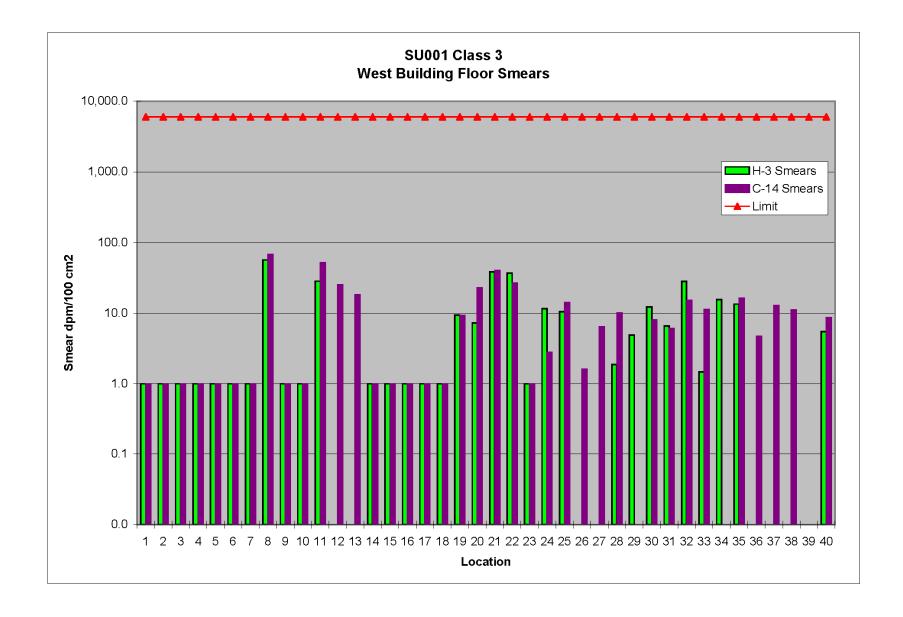
			В	eta	H-C	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Le	oc.*	(dpm/100cm <sup>2</sup> )				
1	С	Ceiling	1,317	60,000	0.0	6,000	1.9
2	С	Ceiling	559	60,000	2.2	6,000	4.2
3	C	Ceiling	2,925	60,000	22.3	6,000	11.9
4	С	Ceiling	2,692	60,000	11.1	6,000	2.5
5	С	Ceiling	2,669	60,000	0.0	6,000	0.0
6	С	Ceiling	2,156	60,000	6.6	6,000	0.0
7	С	Ceiling	3,275	60,000	3.5	6,000	0.0
8	С	Ceiling	18,891	60,000	10.2	6,000	14.8
9	С	Ceiling	1,981	60,000	15.7	6,000	15.6
10	С	Ceiling	2,611	60,000	10.3	6,000	14.7
11	С	Ceiling	14,836	60,000	15.3	6,000	12.7
12	С	Ceiling	14,987	60,000	6.8	6,000	15.2
13	С	Ceiling	536	60,000	0.0	6,000	13.1
14	С	Ceiling	3,135	60,000	6.4	6,000	0.0
15	С	Ceiling	3,438	60,000	0.0	6,000	13.1
16	С	Ceiling	3,485	60,000	0.0	6,000	10.7
17	С	Ceiling	3,147	60,000	14.3	6,000	10.9
18	С	Ceiling	3,520	60,000	0.0	6,000	0.0
19	С	Ceiling	2,459	60,000	0.0	6,000	5.8
20	С	Ceiling	2,576	60,000	0.0	6,000	5.9
21	С	Ceiling	2,273	60,000	8.7	6,000	1.5
22	С	Ceiling	-350	60,000	6.7	6,000	0.0
23	С	Ceiling	3,112	60,000	9.5	6,000	0.0
24	С	Ceiling	-303	60,000	0.0	6,000	9.4
25	С	Ceiling	303	60,000	9.3	6,000	0.0
26	С	Ceiling	-221	60,000	17.5	6,000	0.9
27	С	Ceiling	-734	60,000	44.5	6,000	14.3
28	С	Ceiling	82	60,000	0.4	6,000	0.7
29	С	Ceiling	-1,177	60,000	28.3	6,000	13.8
30	С	Ceiling	-676	60,000	30.0	6,000	24.7
31	С	Ceiling	-105	60,000	18.6	6,000	6.9
32	С	Ceiling	-781	60,000	30.2	6,000	6.3
33	С	Ceiling	-629	60,000	21.7	6,000	14.2
34	С	Ceiling	-664	60,000	13.8	6,000	4.9
35	С	Ceiling	-431	60,000	29.7	6,000	7.6
36	С	Ceiling	-280	60,000	11.6	6,000	18.5
37	С	Ceiling	-233	60,000	14.0	6,000	3.6
38	С	Ceiling	-47	60,000	3.5	6,000	0.0
39	С	Ceiling	-82	60,000	11.2	6,000	26.6
40	С	Ceiling	210	60,000	14.7	6,000	1.1
Average	С	Ceiling	2,262		11.2		7.7
Standard Deviation	С	Ceiling	4,346		10.6		7.2
Maximum	С	Ceiling	18,891		44.5		26.6

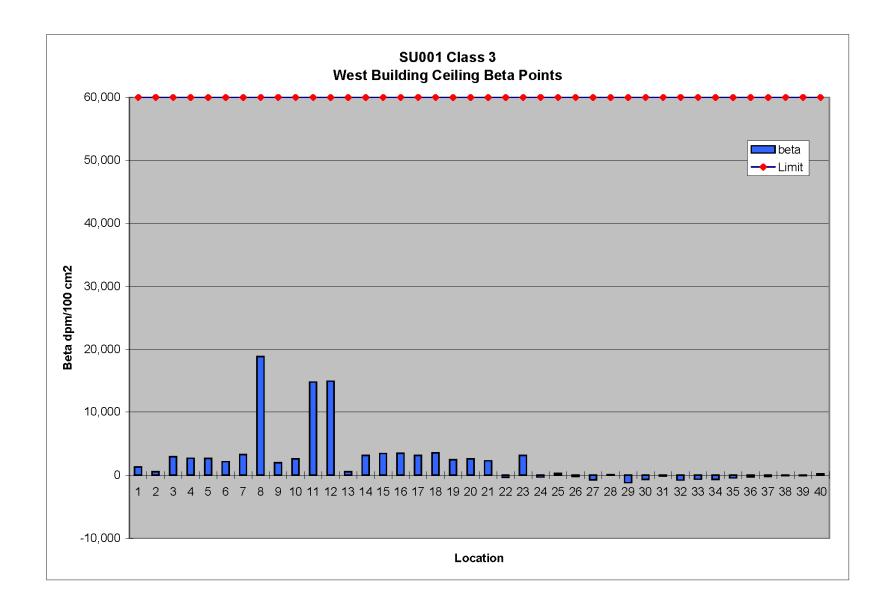
EaglePicher FSS Data Sheet Survey Unit 001 West Building

		Detector				
<b>Detector Type</b>	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

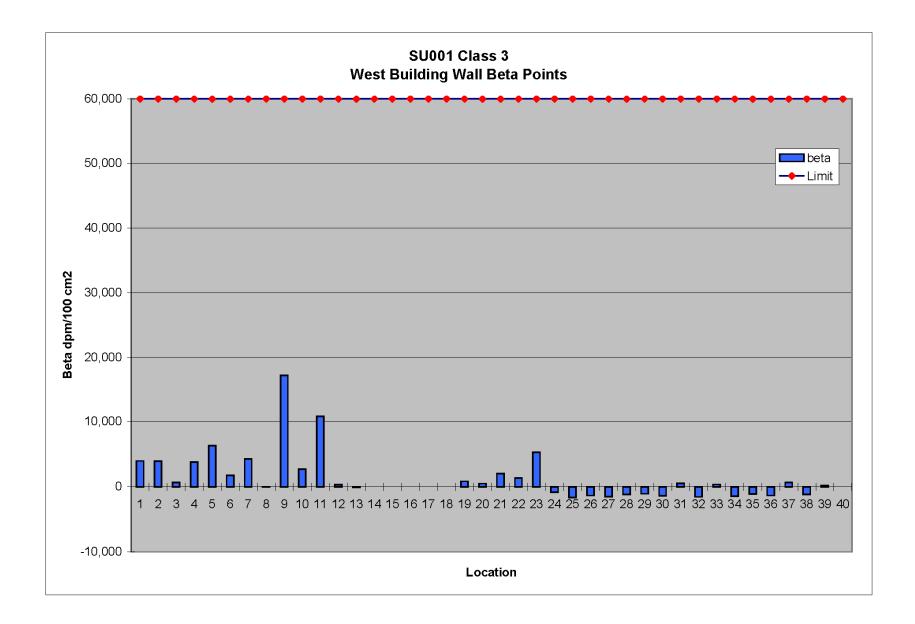
			В	eta	H-S	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	oc.*	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup>
1	W	Walls	3,968	60,000	13.2	6,000	8.0
2	W	Walls	3,917	60,000	11.7	6,000	17.2
3	W	Walls	668	60,000	0.0	6,000	10.9
4	W	Walls	3,791	60,000	7.0	6,000	12.8
5	W	Walls	6,295	60,000	16.8	6,000	24.9
6	W	Walls	1,751	60,000	0.0	6,000	10.3
7	W	Walls	4,273	60,000	16.7	6,000	11.0
8	W	Walls	-42	60,000	9.3	6,000	32.7
9	W	Walls	17,227	60,000	0.0	6,000	7.1
10	W	Walls	2,691	60,000	19.1	6,000	1.8
11	W	Walls	10,796	60,000	0.8	6,000	12.9
12	W	Walls	313	60,000	10.1	6,000	2.2
13	W	Walls	-85	60,000	0.0	6,000	4.6
14	W	Walls	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
15	W	Walls	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
16	W	Walls	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
17	W	Walls	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
18	W	Walls	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
19	W	Walls	821	60,000	0.0	6,000	4.6
20	W	Walls	491	60,000	0.0	6,000	2.1
21	W	Walls	2,022	60,000	0.0	6,000	0.0
22	W	Walls	1,354	60,000	89.4	6,000	8.9
23	W	Walls	5,314	60,000	NA	6,000	NA
24	W	Walls	-855	60,000	17.3	6,000	1.1
25	W	Walls	-1,667	60,000	2.4	6,000	3.1
26	W	Walls	-1,362	60,000	12.8	6,000	6.2
27	W	Walls	-1,523	60,000	0.0	6,000	4.6
28	W	Walls	-1,193	60,000	0.0	6,000	0.0
29	W	Walls	-1,075	60,000	18.5	6,000	2.4
30	W	Walls	-1,388	60,000	9.9	6,000	0.0
31	W	Walls	508	60,000	12.6	6,000	8.7
32	W	Walls	-1,548	60,000	11.2	6,000	3.9
33	W	Walls	347	60,000	5.3	6,000	12.8
34	W	Walls	-1,455	60,000	0.6	6,000	2.9
35	W	Walls	-1,091	60,000	3.3	6,000	7.1
36	W	Walls	-1,362	60,000	1.5	6,000	2.5
37	W	Walls	652	60,000	0.0	6,000	7.2
38	w	Walls	-1,176	60,000	7.3	6,000	6.6
39	W	Walls	212	60,000	0.0	6,000	7.1
40	W	Walls		60,000	0.0	6,000	2.1
Average			1,517		8.7		7.4
Standard Deviation			3,917		15.7		7.0
Maximum		1	17,227		89.4		32.7

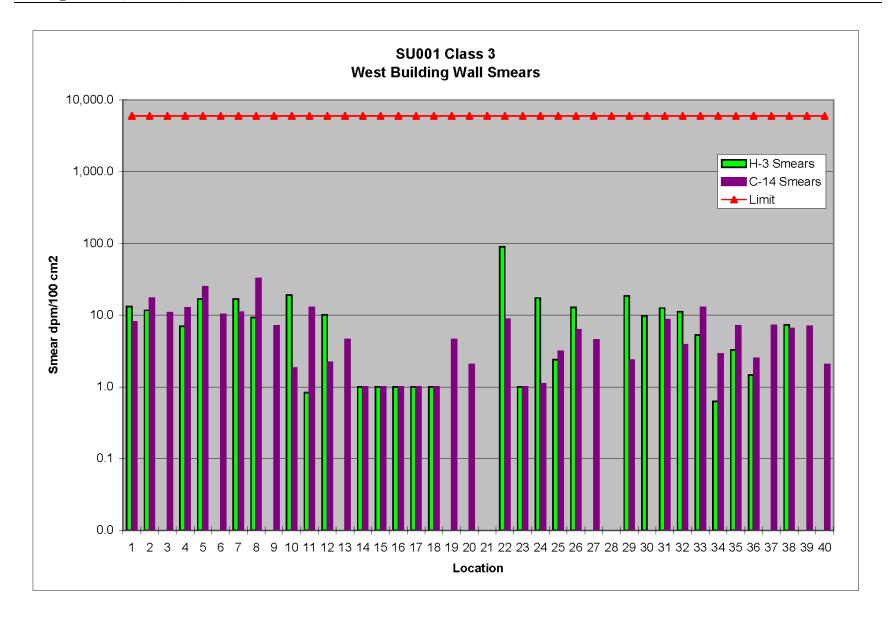














#### M2350-1 Download BETA Report

File Name : 00000031 Survey Descri	ption :SU001 Floor and Walls Point	ts 1-13,22,24,25,26-38,3
Survey Reason : Final Status		
User ID : RPS2366	Technician Name : Richard Ston	ey
Instrument Model : 2350-1	Instrument S/N : 95359	Instrument Cal, Due : 9/30/2010
Detector Model : 43-68b	Detector S/N: 119337	Detector Cal. Due : 9/30/2010
Measurement Type : BETA	Detector Type : 02200 : 126 cm2	Gas Proportional Detector
Detector Area : 126	Efficiency: 0.0938	Survey Date : 10/26/2009
Minimum Net DPM Observed: -2056	Mean Net DPM: 10284	
Maximum Net DPM Observed: 296756	STDEV Observed: 36487	# of Samples Taken: 69
Richard Stoney	Kichella	10-26-2009
Print Name	Signature	10-26-2009 Date
Print Name	Signature	Date

*I Mum	reading	of 7,4	08 dpm	100 cm 2	on f	Floor	and
, 227	dpm /	00 Cmd	on wal	11.			
	, 227	,227 dpm/1	, 227 dpm / 100 cm à	, 227 dpm / 100 cm à on wa'l	,227 dpm /100 cm² on wa'll	,227 dpm / 100 cm² on wall.	ximum reading of 7,408 dpm/100cm² on floor, 227 dpm/100 cm² on wall.

Sign-Off Paul Ey Paul Ele 11/2/09
Print Name Y Paul Ele 11/2/09
Page 1 of 3

### Duratek Beta Survey Report

Download File Name: 00000031

F01 F01 F01 F01	0 1 2	4,611.0 4,033.0	600 60	PRBBK	00	77777	14	561	
F01			60	DDDDK					-845
F01	2			PRBBK	00	22222	15	561	29,377
		3,826.0	600	PRBBK	.00	ZZZZZ	10	561	-1,509
FO4	3	4,024.0	60	PRBBK	00	22222	17	561	29,301
1.41	4	3,483.0	600	PRBBK	00	27272	18	561	-1,800
F01	5	4,020.0	60	PRBBK	00	22222	19	561	29,267
FOT	6	3,952.0	60	PRBBK	00	22222	20	561	28,692
F01	7	1,375.0	60	PRBBK	00	22222	21	561	6.887
F01	8	4,016.0	60	PRBBK	00	77777	22	561	29,233
F01	9	4,301.0	60	PRBBK	00	27777	23	561	31,645
FL01	10	561.0	81	FLDBK	B0002	27272	1	561	-1,231
FL01	11	799.0	60	FLOCT	B0002	27272	1	561	2,014
FL01	12	1,210.0	60	FLOCT	B0002	22222	1	561	5,491
FL01	13	1,335,0	60	FLDCT	B0002	77777	3		6,549
FLQ1	14	1,251.0	60	FLDCT	B0002	ZZZZZ	3		5,838
FL01	15	1.231.0	60	FLDCT	B0002	ZZZZZ	4	561	5,869
WOT	18	1,030.0	60	FLDCT	B0004	22222			3,968
W01	17	1,024.0	60	FLDCT	B0004	ZZZZZ			3,917
Wos	18	640.0	60	FLDCT	B0004	ZZZZZ			668
W01	19	1,009.0	60	FLDCT	B0004	22222	4		3,791
W01	20	1,305.0	60	FLOCT	B0004	77777	5	561	6,295
FL01	21	2,062,0	60	FLDCT	B0002	77777			12,700
FL01	22	35.634.0	60	FLDCT	B0002	22222		561	296,756
FL01	23	4,421.0	60	FLDCT	B0002	22222			32,660
W01	24	768.0	60	FLDCT	80004	ZZZZZ			1,751
WOT	25	1,066.0	60	FLDCT	B0004	ZZZZZ			4,273
W01	26	556.0	60	FLDCT	B0004	77777			-42
FL01	27	1.052.0	60	FLDCT	B0002	ZZZZZ			4,154
FL01	28	548.0	60	FLOBK	80002	77777			-110
FL01	29	2,257.0	60	FLDBK	80002				14,350
FL01	30	2,020.0	60	FLDCT	80002	ZZZZZ			12,345
FLOT	31	1,820.0	60	FLDCT	B0002	22222			10,653
FL01	32	1,446.0	60	FLDCT	B0002				7,488
W01	33	1,837.0	60	FLDCT	B0004	77777		-	10,796
W01	34	2,597.0	60	FLDCT	B0004	77777			17,227
W01	35	879.0	60	FLDCT	B0004				2,691
FL01	36	491.0	60	FLDBK	B0004	22222			-592
FL01	37	661.0	60	FLDCT		22222			846
FL01			60						719
	F01 FL01 FL01 FL01 FL01 FL01 FL01 FL01 W01 W01 W01 W01 W01 FL01 FL01 FL01 FL01 FL01 FL01 FL01 FL	F01 B FL01 10 FL01 11 FL01 12 FL01 13 FL01 14 FL01 15 W01 16 W01 17 W01 18 W01 19 W01 20 FL01 21 FL01 22 FL01 23 W01 24 W01 25 FL01 26 FL01 27 FL01 28 FL01 29 FL01 30 FL01 31 FL01 32 W01 33 W01 34 W01 35 FL01 37	F01 9 4,301.0 FL01 10 561.0 FL01 11 799.0 FL01 12 1,210.0 FL01 13 1,335.0 FL01 14 1,251.0 FL01 15 1,231.0 W01 16 1,030.0 W01 17 1,024.0 W01 18 640.0 W01 19 1,009.0 W01 20 1,305.0 FL01 21 2,062.0 FL01 22 35,634.0 FL01 23 4,421.0 W01 24 768.0 W01 25 1,066.0 W01 26 556.0 FL01 27 1,052.0 FL01 28 548.0 FL01 29 2,257.0 FL01 29 2,257.0 FL01 30 2,020.0 FL01 31 1,820.0 FL01 32 1,446.0 W01 33 1,837.0 W01 34 2,597.0 W01 36 879.0 FL01 36 491.0 FL01 37 661.0	F01 9 4,301.0 60 FL01 10 561.0 81 FL01 11 799.0 60 FL01 12 1,210.0 55 FL01 13 1,335.0 80 FL01 14 1,251.0 60 FL01 15 1,231.0 60 W01 16 1,030.0 60 W01 17 1,024.0 60 W01 18 640.0 60 W01 19 1,009.0 60 W01 20 1,305.0 60 FL01 21 2,062.0 60 FL01 22 35,634.0 60 FL01 23 4,421.0 60 W01 24 768.0 60 FL01 25 1,066.0 60 W01 26 556.0 60 FL01 27 1,052.0 60 FL01 28 548.0 60 FL01 29 2,257.0 60 FL01 29 2,257.0 60 FL01 30 2,020.0 60 FL01 31 1,820.0 60 FL01 32 1,446.0 60 FL01 33 1,837.0 60 FL01 34 2,597.0 60 FL01 35 499.0 60 FL01 36 491.0 60 FL01 37 661.0 60 FL01 36 491.0 60 FL01 37 661.0 60	F01 9 4,301.0 60 PRBBK FL01 10 561.0 81 FLDBK FL01 11 799.0 60 FLDCT FL01 12 1,210.0 60 FLDCT FL01 13 1,335.0 60 FLDCT FL01 14 1,251.0 60 FLDCT FL01 15 1,231.0 60 FLDCT W01 16 1,030.0 60 FLDCT W01 18 640.0 60 FLDCT W01 19 1,009.0 60 FLDCT W01 19 1,009.0 60 FLDCT FL01 21 2,062.0 60 FLDCT FL01 23 4,421.0 60 FLDCT FL01 24 768.0 60 FLDCT W01 25 1,066.0 60 FLDCT W01 26 556.0 60 FLDCT FL01 27 1,052.0 60 FLDCT FL01 28 548.0 60 FLDCT FL01 29 2,257.0 60 FLDCT FL01 30 2,020.0 60 FLDCT FL01 31 1,820.0 60 FLDCT FL01 32 1,446.0 60 FLDCT FL01 33 1,837.0 60 FLDCT FL01 34 2,597.0 60 FLDCT FL01 35 679.0 60 FLDCT FL01 36 491.0 60 FLDCT FL01 37 661.0 60 FLDCT FL01 36 491.0 60 FLDCT FL01 36 FLDCT FL01 36 FLDCT FL01 36 FLDCT FL01 37 661.0 60 FLDCT	F01 9 4,301.0 60 PRBBK 00 F101 10 561.0 81 FLDBK B0002 F101 11 799.0 60 FLDCT B0002 F101 12 1,210.0 60 FLDCT B0002 F101 13 1,335.0 60 FLDCT B0002 F101 14 1,251.0 60 FLDCT B0002 F101 15 1,231.0 60 FLDCT B0002 W01 16 1,030.0 60 FLDCT B0004 W01 17 1,024.0 60 FLDCT B0004 W01 18 640.0 60 FLDCT B0004 W01 19 1,009.0 60 FLDCT B0004 W01 19 1,009.0 60 FLDCT B0004 F101 21 2,062.0 60 FLDCT B0002 F101 23 4,421.0 60 FLDCT B0002 F101 23 4,421.0 60 FLDCT B0002 F101 24 768.0 60 FLDCT B0004 W01 26 556.0 80 FLDCT B0004 F101 27 1,052.0 80 FLDCT B0004 F101 28 548.0 60 FLDCT B0004 F101 29 2,257.0 80 FLDCT B0002 F101 29 2,257.0 80 FLDCT B0002 F101 31 1,820.0 60 FLDCT B0002 F101 32 1,446.0 80 FLDCT B0002 F101 33 1,837.0 60 FLDCT B0002 F101 34 2,597.0 80 FLDCT B0004 F101 35 879.0 80 FLDCT B0004 F101 36 491.0 80 FLDCT B0004 F101 37 661.0 60 FLDCT B0004 F101 36 491.0 60 FLDCT B0004 F101 37 661.0 60 FLDCT B0004 F101 36 491.0 60 FLDCT 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1,210.0 60 FLDCT 80002 ZZZZZ 1 FFLOI 13 1,335.0 60 FLDCT 80002 ZZZZZ 1 FFLOI 14 1,251.0 60 FLDCT 80002 ZZZZZ 3 FFLOI 15 1,231.0 60 FLDCT 80002 ZZZZZ 3 FFLOI 16 1,030.0 80 FLDCT 80002 ZZZZZ 4 WOIT 16 1,030.0 80 FLDCT 80004 ZZZZZ 1 WOIT 17 1,024.0 60 FLDCT 80004 ZZZZZ 2 WOIT 18 640.0 60 FLDCT 80004 ZZZZZ 3 WOIT 19 1,009.0 80 FLDCT 80004 ZZZZZ 3 WOIT 19 1,009.0 80 FLDCT 80004 ZZZZZ 4 WOIT 19 1,009.0 80 FLDCT 80004 ZZZZZ 5 FFLOI 21 2,062.0 60 FLDCT 80002 ZZZZZ 5 FFLOI 22 35,634.0 80 FLDCT 80002 ZZZZZ 6 FFLOI 23 4,421.0 80 FLDCT 80002 ZZZZZ 6 FFLOI 24 768.0 60 FLDCT 80002 ZZZZZ 7 WOIT 25 1,066.0 60 FLDCT 80004 ZZZZZ 7 WOIT 26 556.0 80 FLDCT 80004 ZZZZZ 7 WOIT 26 556.0 80 FLDCT 80004 ZZZZZ 8 FFLOI 27 1,052.0 80 FLDCT 80004 ZZZZZ 8 FFLOI 28 548.0 60 FLDCT 80004 ZZZZZ 8 FFLOI 29 2,257.0 80 FLDCT 80002 ZZZZZ 9 FLOI 29 2,257.0 80 FLDCT 80002 ZZZZZ 9 FLOI 31 1,820.0 80 FLDCT 80002 ZZZZZ 9 FLOI 32 1,446.0 60 FLDCT 80002 ZZZZZ 9 FLOI 33 1,837.0 80 FLDCT 80002 ZZZZZ 9 FLOI 34 1,2597.0 80 FLDCT 80002 ZZZZZ 10 FLOI 35 679.0 80 FLDCT 80004 ZZZZZ 11 FLOI 36 491.0 80 FLDCT 80004 ZZZZZ 11 FLOI 36 491.0 80 FLDCT 80004 ZZZZZ 10 FLOI 37 661.0 80 FLDCT 80004 ZZZZZ 11 FLOI 36 491.0 80 FLDCT 80004 ZZZZZ 11 FLOI 36 491.0 80 FLDCT 80004 ZZZZZ 11 FLOI 37 661.0 80 FLDCT 80004 ZZZZZ 12 FLOI 38 679.0 80 FLDCT 80004 ZZZZZ 10 FLOI 39 7 661.0 80 FLDCT 80004 ZZZZZ 11 FLOI 36 491.0 80 FLDCT 80004 ZZZZZ 11 FLOI 36 491.0 80 FLDCT 80004 ZZZZZ 12 FLOI 36 681.0 80 FLDCT 80004 ZZZZZ 12 FLOI 36 681.0 80 FLDCT 80004 ZZZZZ 10 FLOI 36 681.0 80 FLDCT 80004 ZZZZZ 12	FOIT 8 4.016.0 60 PRBBK 00 ZZZZZ 22 561 FOIT 9 4.301.0 60 PRBBK 00 ZZZZZ 23 561 FILOT 10 561.0 81 FLDBK 80002 ZZZZZ 1 561 FLOT 11 799.0 80 FLDCT 80002 ZZZZZ 1 561 FLOT 12 1.210.0 50 FLDCT 80002 ZZZZZ 1 561 FLOT 13 1.335.0 60 FLDCT 80002 ZZZZZ 1 561 FLOT 14 1.251.0 60 FLDCT 80002 ZZZZZ 3 561 FLOT 15 1.231.0 60 FLDCT 80002 ZZZZZ 3 561 FLOT 16 1.030.0 80 FLDCT 80002 ZZZZZ 3 561 WOT 16 1.030.0 80 FLDCT 80004 ZZZZZ 4 561 WOT 17 1.024.0 60 FLDCT 80004 ZZZZZ 2 561 WOT 18 640.0 60 FLDCT 80004 ZZZZZ 3 561 WOT 19 1.009.0 80 FLDCT 80004 ZZZZZ 3 561 WOT 19 1.009.0 80 FLDCT 80004 ZZZZZ 4 561 FLOT 20 1.305.0 80 FLDCT 80004 ZZZZZ 5 561 FLOT 21 2.062.0 60 FLDCT 80002 ZZZZZ 5 561 FLOT 22 35.634.0 80 FLDCT 80002 ZZZZZ 5 561 FLOT 23 4.421.0 80 FLDCT 80002 ZZZZZ 5 561 WOT 25 1.066.0 60 FLDCT 80002 ZZZZZ 7 581 WOT 26 556.0 80 FLDCT 80002 ZZZZZ 7 581 WOT 26 556.0 80 FLDCT 80004 ZZZZZ 7 561 WOT 26 556.0 80 FLDCT 80004 ZZZZZ 7 561 WOT 26 556.0 80 FLDCT 80004 ZZZZZ 7 561 FLOT 27 1.052.0 80 FLDCT 80004 ZZZZZ 7 561 FLOT 28 548.0 60 FLDCT 80004 ZZZZZ 7 561 FLOT 29 2.267.0 80 FLDCT 80004 ZZZZZ 8 561 FLOT 29 2.267.0 80 FLDCT 80004 ZZZZZ 8 561 FLOT 29 2.267.0 80 FLDCT 80004 ZZZZZ 9 561 FLOT 29 2.267.0 80 FLDCT 80002 ZZZZZ 9 561 FLOT 30 2.020.0 80 FLDCT 80002 ZZZZZ 9 561 FLOT 31 1.820.0 60 FLDCT 80002 ZZZZZ 9 561 FLOT 32 1.446.0 60 FLDCT 80002 ZZZZZ 9 561 FLOT 31 1.820.0 60 FLDCT 80002 ZZZZZ 9 561 FLOT 32 1.446.0 60 FLDCT 80002 ZZZZZ 9 561 FLOT 32 1.446.0 60 FLDCT 80002 ZZZZZ 1 561 FLOT 33 1.837.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 34 1.480.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 35 1.446.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 36 491.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 36 491.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 36 491.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 36 491.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 36 491.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 36 491.0 60 FLDCT 80004 ZZZZZ 1 561 FLOT 36 491.0 60 FLDCT 80004 ZZZZZ 1 561

Monday, November 02, 2009

Page 2 of 3

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU01	W01	39	551.0	60	FLDCT	B0004	77777	13	561	-85
SU01	W01	40	598.0	60	FLDCT	B0004	<b>ZZZZZ</b>	12	561	313
SU01	W01	41	721.0	60	FLDCT	B0004	77777	22	561	1,354
SU01	FL01	42	813.0	60	FLDCT	B0002	27272	22	561	2,132
SU01	FL01	43	519.0	60	FLDBK	B0002	ZZZZZ	22	561	-355
SU01	FL01	44	628.0	60	FLDCT	B0002	22222	24	561	567
SU01	W01	45	460.0	60	FLDCT	B0004	27777	24	561	-855
SU01	FL01	46	624.0	60	FLDCT	B0002	27222	25	561	533
SU01	W01	47	364.0	60	FLDCT	B0004	22272	25	561	-1,867
SU01	FL01	48	524.0	60	FLDCT	B0002	22222	28	561	-313
SUD1	FL01	49	535.0	60	FLDCT	B0002	ZZZZZ	27	581	-220
SU01	FL01	50	561.0	80	FLDCT	B0002	277.22	28	561	0
SU01	FL01	51	522.0	60	FLDCT	B0002	27777	29	561	-330
SU01	FL01	52	536.0	60	FLOCT	80002	22222	30	561	-212
SU01	FLOT	53	586,0	60	FLOCT	B0002	27277	31	561	212
SUDT	FLOT	54	572.0	60	FLDCT	80002	ZZZZZ	32	581	93
SU01	FL01	55	582.0	60	FLDCT	B0002	27227	33	561	178
SU01	FL01	56	525.0	60	FLDCT	B0002	27777	34	561	-305
SU01	FL01	57	608.0	60	FLOCT	B0002	77272	35	561	398
SUO1	FL01	58	527.0	60	FLDCT	B0002	ZZZZZ	36	561	-288
SU01	FL01	59	575.0	60	FLOCT	B0002	77777	37	561	118
SUO1	FL01	60	566 0	60	FLDCT	B0002	77777	38	561	42
SU01	FL01	61	537.0	60	FLDCT	B0002	22272	39	561	-203
SUO1	FL01	62	570.0	60	FLDCT	B0002	ZZZZZ	40	561	76
SU01	FL01	63	474.0	60	FLDBK	B0002	27777	0	561	-736
SU01	W01	64	318.0	60	FLDBK	B0004	ZZZZZ	40	581	-2,056
SU01	Wot	65	348.0	60	FLDBK	B0004	7.77.7.7	39	561	-1,802
5001	WOT	68	3,462.0	600	PTBBK	B0004	ZZZZZ	40	561	-1,817
SUD1	XXX	87	4,137.0	60	PTSC1	B0004	ZZZZZ	0	561	30,257
SU01	XXX	68	4,420.0	60	PTSC1	B0004	22272	1	561	32,651

	Beta Flag	45000 -	
	Beta Max Flag	60000	
Monday November 02	2000		. 3 =



M2350-1 Download BETA Report

Survey Reason : Final Status					
User ID : SXM1098	Technician Name : Sharon McChesney				
Instrument Model : 2350-1	Instrument S/N : 80502	Instrument Cal. Due: 9/30/2010			
Detector Model : 43-68b	Detector S/N : 095523	Detector Cal. Due : 9/30/2010			
Measurement Type : BETA	Detector Type : 02200 : 126 cm2 Gas Proportional Detector				
Detector Area : 126	Efficiency 0.0681	Survey Date : 10/27/2009			
Minimum Net DPM Observed: -1177	Mean Net DPM: 3107				
Maximum Net DPM Observed: 44705	STDEV Observed: 7493	# of Samples Taken: 46			
Sharon McChesney	3how Miller	10-27-09			
Print Name	Signature	Date			

Maryman scan reading of 2200 cpm.

Sign-Off PAUL ELY Seelley 10/29/09
Print Name Y Signature 10/29/09
Page 1 of 3

## Duratek Beta Survey Report

Download File Name: 00000036

ackage D(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
01F	C01	0	422.0	60	FLDBK	B0012	27777	1	392	350
01F	C01	1	2,013.0	60	FLDCT	B0012	22772	8	392	18,891
01F	C01	2	1,678.0	60	FLDCT	B0012	ZZZZZ	12	392	14,987
01F	C01	3	438.0	60	FLDCT	B0012	ZZZZZ	13	392	536
01F	C01	4	399.0	60	FLDCT	B0012	22272	28	392	82
01F	C01	5	363.0	60	FLDCT	B0012	72772	31	392	-105
01F	C01	6	373 0	60	FLDCT	80012	77777	26	392	-221
01F	C01	7	329.0	60	FLDCT	B0012	22222	27	392	-734
01F	C01	8	291.0	60	FLDCT	B0012	27777	29	392	-1,177
OTF	C01	9	334.0	60	FLDCT	80012	ZZZZZ	30	392	-676
D1F	C01	10	325.0	60	FLDCT	B0012	ZZZZZ	32	392	-781
DIF	C01	11	335.0	60	FLOCT	80012	27777	34	392	-664
DIF	C01	12	355.0	60	FLDCT	B0012	22222	35	392	-431
01F	C01	13	338.0	50	FLDCT	80012	27777	33	392	-629
DIF	C01	14	372.0	.60	FLDCT	B0012	ZZZZZ	37	392	-233
01F	C01	15	385.0	60	FLDGT	B0012	77777	39	392	-82
01F	C01	16	410.0	60	FLDCT	B0012	ZZZZZ	40	392	210
11F	C01	17	388.0	60	FLDCT	B0012	22222	38	392	-47
1F	C01	18	368.0	60	FLOCT	B0012	22772	36	392	-280
)1F	C01	19	362.0	60	FLOCT	B0012	ZZZZZ	22	392	-350
HF	C01	20	398.0	60	FLDBK	80012	22772	2	392	70
1F	C01	21	366.0	60	FLDCT	B0012	77777	24	392	-303
)1F	C01	22	418.0	80	FLDCT	80012	27222	25	392	303
DIF	C01	23	603.0	60	FLDCT	B0012	22277	19	392	2,459
1F	COT	24	613.0	60	FLOCT	B0012	22222	20	392	2,576
1F	C01	25	587.0	60	FLDCT	B0012	27777	21	392	2,273
nF.	C01	26	1,665.0	60	FLDCT	B0012	77777	11	392	14.836
HE	C01	27	816.0	60	FLOCT	B0012	27272	10	392	2,611
nF .	C01	28	562.0	60	FLOCT	B0012	77277	9	392	1,981
1F	COI	29	621.0	60	FLOCT	B0012	22222	5	392	2,669
HE	C01	30	505.0	60	FLDCT	B0012	ZZZZZ	1	392	1,317
1F	C01	31	440.0	60	FLOCT	B0012	77777	2	392	559
	C01	32	643.0	60	FLDCT	B0012	ZZZZZ	3	392	
	C01	33	577 0	60	FLDCT	B0012	27772	5	392	2,925
	C01	34	623 0	60	FLDCT	B0012	27777	4	392	2.156
	C01	35	673.0	60	FLDCT	B0012	22222	7	392	2,692
	C01	36	659.0	60	FLDCT	B0012	27777	23	392	3,275
	C01	37	661.0	60	FLDCT	B0012	77777	14	392	3,112
	C01	38	687.0	60	FLDCT	B0012	77777	15	392	3,135 3,438

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Wednesday, October 28, 2009

Page 2 of 3

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU01F	C01	39	694.0	60	FLDCT	B0012	77777	18	392	3,520
SU01F	C01	40	662.0	60	FLDCT	B0012	ZZZZZ	17	392	3,147
SU01F	C01	41	691.0	60	FLDCT	B0012	ZZZZZ	16	392	3,485
SU01F	C01	42	356.0	60	FLDBK	B0012	ZZZZZ	3	392	-420
ZZZZZ	ZZZZZ	43	3,620.0	600	РТВВК	B9999	ZZZZZ	1	0	4,219
ZZZZZ	ZZZZZ	44	3,836.0	60	PTSC1	B9999	ZZZZZ	1	0	44,705
ZZZZZ	ZZZZZ	45	3,042.0	600	РТВВК	B9999	ZZZZZ	2	0	3.545

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 Beta Max Flag
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Wednesday, October 28, 2009

Page 3 of 3



M2350-1 Download BETA Report

File Name : 00000037	Survey Descr	iption :SU001 Floor and Walls 14-21	,23 Walls only 26-38
Survey Reason : Final S	tatus		
User ID : RPS2366		Technician Name : Richard Stone	ву
Instrument Model : 235	50-1	Instrument S/N : 95359	Instrument Cal. Due : 9/30/2010
Detector Model : 43-	68b	Detector S/N: 119337	Detector Cal. Due : 9/30/2010
Measurement Type: BE	TA	Detector Type : 02200 : 126 cm2	Gas Proportional Detector
Detector Area ; 12	6	Efficiency: 0.0938	Survey Date : 10/27/2009
Minimum Net DPM Obse	erved: -1548	Mean Net DPM: 8610	
Maximum Net DPM Obs	erved: 62282	STDEV Observed: 15226	# of Samples Taken: 51
Richard	Stoney	ROWFAX	10-28-7009
Print	Name.	Signature	Date
Print	Name	Signature	Date

omments	MLX1mu 5,314	m reading	ng of 4	7,560 dp	m/100 cm2	on floor a
	3					
-10						

Sign-Off PAUL Ery Paul Ely 10/29/09
Print Name Signature 10/29/09
Page 1 of 3

Download	File Name:	00000037
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Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU001	W01	0	4,129.0	60	PRSC1	B0004	ZZZZZ	2	484	30,841
SU001	W01	1	3,257.0	600	PRBBK	B0004	22272	3	484	-1,339
SU001	W01	2	3.923.0	60	PRSC1	B0004	22772	1	484	29,098
SU001	W01	3	4,172.0	60	PRSC1	B0004	27772	2	484	31,205
SU001	WO1	4	344.0	60	PRSC1	B0004	77777	3	484	-1,185
SU001	WO1	5	352.0	60	FLDBK	B0004	22222	1	484	-1,117
SU001	W01	6	3,457.0	600	PTBBK	B0004	27777	0	484	-1,170
SU001	W01	1	3,286.0	600	PRBBK	B0004	ZZZZZ	0	484	-1,315
SU001	W01	8	4,097.0	60	PRSC1	80004	27277	1	484	30,570
SU001	Wor	9	948.0	60	PRSC1	B0004	27777	2	484	3,926
SU001	W01	10	3,969.0	60	PRSC1	B0004	77777	3	484	29,487
SU001	Wot	31	4,062.0	60	PRSC1	B0004	77777	4	484	30,274
SU001	W01	12	3,998.0	60	PRSC1	B0004	27772	5	484	29,715
SU001	W01	13	4,276.0	60	PRSC1	B0004	ZZZZZ	8	484	32,084
SU001	FL01	14	416.0	60	FLOBK	B0002	Z2222	23	484	-575
1000	FL01	15	6,105.0	60	FLDCT	B0002	22272	23	484	47,560
SU001	W01	16	1,112.0	60	FLOCT	B0004	77777	23	484	5,314
SU001	W01	17	544.0	80	FLDCT	B0004	Z2777	31	484	508
SUOOT	Wot	18	525.0	60	FLOCT	B0004	72777	33	484	347
SUODT	W01	19	509.0	60	FLOCT	B0004	ZZZZZ	39 U	484	212
U001	W01	20	561.0	60	FLDCT	B0004	22222	37	484	652
SU001	W01	21	345.0	60	FLDCT	B0004	22722	38	484	
SU001	W01	22	355.0	60	FLDCT	B0004	22722	35	484	-1,178 -1,091
SU001	FL01	23	446.0	60	FLDBK	B0002	77777	38	484	
U001	W01	24	323.0	60	FLDCT	80004	22222	36	484	-322
U001	W01	25	343.0	60	FLDCT	B0004	22222	28	484	-1,382
SUGO1	WOT	26	581.0	60	FLDCT	80004	ZZZZZ	19		-1,193
U001	W01	27	542.0	60	FLDCT	B0004	27777	20	484	821
U001	FL01	28	606.0	50	FLDCT	B0002	ZZZZZ			491
SU001	FL01	29	579.0	80	FLDCT	B0002	27222	19	484	1,032
U001	FLOT	30	484.0	60	FLDBK	B0002	27777		484	804
U001	FL01	-31	610.0	60	FLDGT	80002	27777	20	484	0
SU001	W01	32	723.0	60	FLDCT	B0002		21	484	1,066
SU001	W01	33	301.0	60	FLDCT	B0004	77777	21	464	2,022
SU001	WD1	34	312.0	60	FLDCT		22222	32	484	-1.548
U001	W01	35	323.0	60	FLDCT	B0004	27222	34	484	-1,455
U001	W01	36	304.0	60	FLDCT	B0004	22222	26	484	-1,362
U001	W01	37	357.0	60		B0004	ZZZZZ	27	484	-1,523
	W01	38	320.0		FLDCT	B0004	77777	29	484	-1,075
0001	VV01	38	320.0	60	FLDCT	B0004	27777	30	484	-1,388
			Beta Flag	,		45000 -		1		
		1	Beta Max	rtag		60000				

Wednesday, October 28, 2009

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)	
SU001	FL01	40	484.0	60	FLDBK	B0002	27777	14	484	0	
SU001	FL01	41	707.0	60	FLDCT	B0002	22222	14	484	1,887	
SU001	FL01	42	802.0	60	FLDCT	B0002	27777	15	484	2,691	1.5.417
SU001	FL01	43	784.0	60	FLDCT	B0002	22222	16	484	2,538	L +054012
SU001	FL01	44	688.0	60	FLDCT	B0002	ZZZZZ	17	484	1,726	
SU001	FL01	45	1,009.0	60	FLDCT	B0002	ZZZZZ	18	484	4,442	)
SU001	W01	46	7,845.0	60	FLDCT	B0004	ZZZZZ	14	484	62,282	)
SU001	W01	47	4,036.0	60	FLDCT	B0004	27777	15	484	30,054	
SU001	W01	48	2,619.0	60	FLDCT	B0004	22272	16	484	18,064	Wall to
SU001	Wot	49	1,338.0	60	FLDCT	B0004	22222	17	484		
SU001	W01	50	2,927.0	60	FLDCT	B0004	22222	18	484	20,670	Sradwaste
SU001	FL01	51	450.0	60	FLDBK	B0002	ZZZZZ	18	484	-288	

	Beta Flag Beta Max Flag	45000	
Wednesday, October 2	8, 2009		Page 3 of 3

25 16 35

SU1 F40

1.00

2.73 263.5

7.27 139.4

5,50

8.62 406.55

```
25 Oct 2009
                    13:24
                                        ALPHA/BETA - 1.09
                                                                                                            Page #1
Protocol #:25
                                        Smears H-3 & C-14
                                                                                       User : EaglePicher / ES
Time: 1.00
                              Nuclides: 3H-14C
Data Mode: Dual DPM
                                                    Quench Sets
                                                      Low Energy: 3H
Background Subtract: 1st Vial
                                                      High Energy: 140
            LL
                       LCR
                              25%
                 IIL
                                       BKG
Region A: 0.0 - 12.0
                        0
                              0.0
                                      9.27
                                     16.73
Region B: 12.0 - 156
                         0
                              0.0
Region C:
          0.0 - 0.0
                              0.0
Quench Indicator: tSIE/AEC
  Ext Std Terminator: Count
FSS Smears in 20 ml Ultima Gold
Coincidence Time(ns): 18
Delay Before Burst(ns): Normal
Protocol Data Filename: C:\EP\PROT.DAT
Count Data Filename: C:\EP\SDATA25.DAT
                                                                C-14
                                                         H-3
                                            C-14
                                4-3
P# PID S#
               SMPL ID TIME
                               CPMA A:25%
                                            CPMB B:25%
                                                         DPM1
                                                                DPM2 tSIE FLAG
                               9.27 20.77
                                           16.73 15.46
25
   2 1
                       10.00
                                                                     426.52
                                                                                to Survey unit 010
                SU1 F1 1.00
                               2.73 263.5
                                            9.27 113.5
                                                         5.19
                                                              11.19 366.57
25
                SU1 F2 1.00
                              42.98 33.93 94.02 22.55 103.57 110.65 373.96
   2 3
25
                SU1 F3
                       1.00
                              14.36 69.01
                                          49.64 33.24 22.71
                                                               59.46 431.56
25
    2 5
                SU1 F4 1.00
                              59.55 28.05 137.45 18.17 137.63 162.13 381.00
                SU1 F5 1.00
                              85.22 22.92 156.78 16.88 192.60 181.35 425.41
25
    2 6
25
                       1.00 36,34 37.54 188.66 15.25 37.26 230.46 380.67
1.00 249.76 12.91 618.50 8.16 578.04 734.49 368.27
                SU1 F6 1.00
25
                SU1 F7
                             20.3/ 47.02 88.63 23.35 41.07 106.31 417.17 41.70 34.55 113.30 20.26 83.95 134.46 402.45 to Surrey unit oil
25
               SU1 F8 1.00
                             27.04 45.13 57.96 30.15 56.50
25
    2 10
               SU1 F9 1.00
25
               SU1 F10 1.00
    2 11
    2 12
25
               SU1 F11
                       1.00
25 10 13
              SU1 F12 1.00
                              0.00 0.00
                                          20.19 61.54
                                                               25.22 398.76
                                                        0.00
25 10 14
              SU1 F13 1.00
                              0.00 0.00 14.27 80.11
                                                        0.00
                                                              18.34 295.84
25
                       1.00
   10 15
              SU1 F19
                               4.04 186.7
                                           7.96 129.0
                                                        9.32
                                                               9.25 407.35
25
   10 16
              5U1 F20
                       1.00
                               4.87 159.4 19.04 64.26
                                                        7.26
                                                               22.96 405.78
25 10 17
              SU1 F21 1,00
                              16.61 62.33
                                          34.39 42.26
                                                       38,52 40,15 397.27
25 10 18
              SU1 F22 1.00
                              14.57 68.32 23.43 55.21
                                                       36.87 26.82 395.17
25 10 19
              SU1 F24
                       1.00
                               4,22 179.8
                                           2.78 331.5
                                                       11.58
                                                               2.77 425.22
25 10 20
              SU1 F25
                       1.00
                               5.04 154.9
                                          11.96 92.14
                                                        10.51
                                                               14.08 416.80
25 10 21
              SU1 F26 1.00
                              0.00 0.00
                                           1,27 698.0
                                                               1.60 371,35
                                                        0.00
25 10 22
              SU1 F27
                      1.00
                              0.00 0.00
                                           5.14 188.7
                                                        0.00
                                                               6,42 408,45
   10 23
              SU1 F28
                       1.00
                               1.73 399.5
                                           8.27 124.9
                                                        1.88 10.03 417.34
25 10 24
              SU1 F29
                              1.73 399.5
                       1.00
                                           0.00 0.00
                                                        4.91
                                                               0.00 463.48
25 16 25
                              4.89 158.8
              SU1 F30
                      1.00
                                           7.11 142.1
                                                       12.26
                                                               8.05 409.99
              SU1 F31 1.00
                              2.78 259.0
25 16 26
                                           5.22 186.3
                                                        6.56
                                                               6.05 405.00
25
   16 27
              SU1 F32
                       1.00
                              10.41 87.21 13.59 83.24
                                                       28,22
                                                              15.23 387.97
25 16 28
              SU1 F33
                      1.00
                              1.73 399.5
                                           9,27 113.5
                                                        1,47
                                                               11.28 414.49
25 16 29
              SU1 F34 1.00
                              5.30 148.6
                                           0.70 1244
                                                       15.54
                                                               0.01 428.58
25 16 30
              SU1 F35
                              6.17 131.2 13.83 82.09
                      1.00
                                                       13,44
                                                              16.23 409.26
25
  16 31
              SU1 F36
                       1.00
                               0.00 0.00
                                           3.74 251.6
                                                        0.00
                                                               4.67 410.65
25 16 32
              SU1 F37
                       1.00
                              0.00 0.00 10.27 104.3
                                                        0.00 12.82 404.53
              SU1 F38 1.00
25 16 33
                              0.00 0.00
                                          8.87 117.7
                                                        0.00 11.06 420.75
25 16 34
              SU1 F39
                      1.00
                              0.00 0.00
                                           0.00 0.00
                                                        0.00
                                                               0.00 418.59
```

		JC	t 2	009 07	:51					A-1				Page		240-
Pr	0	to	col	#:11			S	mears	5	3 & C	-14			User : EaglePicher	- /	1
Time				1 804		W1114.	711	140	Dun	nch Sets						
Date	a i	1006	e: Dua	el DPM		Nuclide	5; 3n-	144		Low Ener						
Baci	ko	rour	nd Sub	tract: 1st	Vial					High Ene						
	-										•					
				LL UL	LER	25%	BKG									
Reg.	10	n A		0.0 - 12.0	0	0.0	7.78									
geā				2.0 - 156	0	0.0	16,32									
Reg	10	n C	; (	0.0 - 0.0	0	0.0	0.00									
Due	ne	h I	ndical	tor: tSTE/AE	C											
				rminator: Co												
				20 ml Ultim												
				ime(ns): 18												
				Burst(ns): N	ormal											
				Filename: C		OT.DAT										
Cou	int	Da	ta Fil	lename: C:\E	P\SDATA	11.DAT										
						H-3		C-14		H-3	C-11	t				
D#	P	ID	9#	SMPL_ID	TIME	A CONTRACTOR	A:25%		B:25%	DPM1	DPM2	tSIE F	LAG			
11		1	1	OIII E_10	10.00		22.67		15.66	21112		427.68	D			
11		1	2	SU1 W1	1.00		99.71		0.00	24.79		424.12	\	These samples not used. A resure was performed on vesure was performed on Nov 2,2009.		
11		1	3	SU1 #2	1.00		145.1		0.00	15,42		422.6:	1	at used. A		
:1		1	4	SU1 W3	1,00		0.00		0.00	0.00	0.00	418.58		Gamples viol		
11		1	5	SU1 W4	1.00		133.8	7,27	138,2	14.11	B,13	421.35	1	These performed or		
:1		1	6	SUL W5	1.00	220,30	13.73	159.60	16.70	638.54	162.03	397.35	7	vesurey was p		
11		1	7	SU1 W6	1.00	0.69	882,7	3.36	274.6	0.71	4.08	424.27	)	1,2009.		
11		1	В	501 97	1.00	3,84	183.3	10.06	105.2	7.38		431.31	/	Nov		
11		1	9	SU1 W8	1.00	6.78	115.5		49,50	9.28	32,67					
1.1			10	SU1 49	1,00		0.00		171.1	0.00		423.09				
11			11	SUI WID	1.00		118.6		384.6	19.09		418.26				
11			12	SU1 W11	1.00		375.7		101.1	0.83		424.98				
11			13	SU1 W12	1.00		191.6		399.1	10.13		422.32				
15			14	SU1 W13	1.00		0.00		252.5	0.00		427.55 428.14				
11			15	SU1 W19	1.00		0.00 2743		526.2	0.00		431.62				
11			16 17	SU1 W20 SU1 W21	1.00		0.00		0.00	0.00		428.94				
11			18	SU1 W22	1.00	32.67			96.20	89.44		455.29				
11			19	SU1 W24	1,00		123,7		526.2	17.33		449.7-				
11		2	20	SU1 W25	1.00		514.3		338.5	2.40		465.79				
11		2		SU1 W26	1.00		142.3		171.1	12.81		452.21				
:1		2	22	SU1 W27	1.00	0.22	2743		252.5	0.00		417.90				
11		2		SU1 W28	1,00		0,00		0.00	0.00		420.41				
11		2	24	SU1 W29	1.00	6.16	124.6	2.74	332.1	18.48	2.38	400.02				
11			25	5U1 W30	1.00	3.22	213.4	0.00	0.00	9.86		417.20				
: 1		3	24	SU1 W31	1.00		142.3		131,9	12.57		425.35				
11			27	SU1 W32	1.00		169.6		252.5	11.17		426.0é				
11			28	SU1 W33	1.00		213.4		100.2	5.30		427.35				
11			29	SU1 W34	1.00		1147		379.7	0.63		416.75				
1.1		3	30	SU1 W35	1.00		338.6		163.4	3,26		434,43				
11			31	SU1 W36	1.00		786.2		422.1	1.46		428.27				
-1			32	SU1 W37	1.00		0.00		167.9	0.00		422.72				
11			33	SU1 W38	1.00		213.4		171.1	7.31		428.45				
:1				MINI MIN												

02 Nov 2009 11:21				ALPHA	/BETA	- 1.09		5400	age #	e #1		
Protoc	ol #:	2		Smear	s H-3	& C-14	ł.		User :	EaglePi	cher	/ ES
Time:	1.0	00										
Data M	ode:	Dual DPI	4		Nuc 1	ides:	3H-14C		Quenc	h Sets		
									Lo	w Energy	: 3H	
Backgr	ound	Subtract	t: 1st	Vial					Hi	gh Energ	y: 14	C
		LL	UL	LCR	25%		BKG					
Region	A:	0.0 -	12.0	0	0.0	12	.16					
Region	B:	12.0 -	156	0	0.0	14	.24					
Region	C:	0.0 -	0.0	0	0.0	0	.00					
Protoc	ol Da	e Burst( ta Filer Filename	name: C	:\EP\P				W-1	to W-			
P#PID	-	SM	1PL_ID	TIME		A:25%		B:25%		14C-DPM		
2 1	1			10.0		18.1		16.8	0.00	0.00	396	
2 1 2 1 2 1 2 1 2 1 2 1 2 1	3	75.75.50	1 W-1	1.0	10010	159		133	13.15			
2 1			1 W-2	1.0	5.8	150		78.9	11.72			
2 1	4		1 W-3	1.0	0.0	0.0	8.8	113	0.00			
2 1	5		1 W-4	1.0	3.8	216		95.6	7.03			
2 1	6		1 W-5	1.0	8.5	110		57.5	16.78			
2 1	7		1 W-6	1.0	0.0	0.0		119	0.00		437	
2 1	8	5000	1 W-7	1.0	6.9	131	9.7	104	16.71	10.99	426	

											340	100		-
28 Oc	t 2	2009	12:	44		ALPH	A/BETA	- 1	.09				Page #	1
Proto	co)	# # 2	25			Smea	rs H-3	5 & C	-14		User	: EagleF		
Time:	.00													
Data Mode	e: Du	al DPM			Nucli	ies: 3H-14C		ch Sets	1					
Backgroun	ri Su	htract	1et Vis	1				ow Energ	gy: 3H rgy: 14C					
packaran	10 00	DLI act.	120 110				n.	rān chei	1 gy: 146					
2011		LL		CR	25%	BKG								
Region A:		0.0 - 1 2.0 -		0	0.0	8.79								
Region B: Region C:		0.0 -		0	0.0	16.42 0.00								
					300									
Quench Ir														
FSS Smear			r: Count	old										
Coinciden				010										
Delay Bef				al										
Protocol														
Count Dat	a Fi	iename:	C:\EP\S	DATAZ	5.002						, 2	C-14		
						H-	3		C-14		H-3	( -111		
P#PI:			SMPL_	ID			1AA:25		CPMBB:29		DFMi	DPM2 tSI	E FLAG	
	2	1	m-27				8 21.		16.4 15.			41		
			. Ceil . Ceil		**	1.0	1.2	0.0 536	1,5	589 261	0.00 2.17	1.87 4.23	452 449	
			Ceil			1.0	9.1			100	22,29	11.89	442	
			Ceil			1.0	4.2	177	2.6	352	11.11	2.54	454	
			Ceil			1.0	0.0	0.0	0.0	0.0	0.00	0.00	446	
			Ceil Ceil			1.0	2.3	301 545	0.0	0.0	6.64 3.51	0.00	455	
			Ceil			1.0	5.2	1.48			10.17	14-81	447	
25	2 1	0SU1	Ceil	ing	3-9	1.0	7.3	113	13.5		15.71	15.64	452	
			Ceil				5.3			88.3				
			Ceil Ceil				6.7 4.0			97.6				
			Ceil				0.0							
			Ceil				2.2			0.0				
			Ceil					3129						
			Ceil Ceil				6.2							
			Ceil				0.0							
25	7 2	05U1	Ceil	ing	1-19	1.0	0.1	4298	4.6					
			Ceil					***						
			Ceil	-		1.0	3.2 2.3	224						
			Ceil			1.0	3.2	22/						
			Ceil	****		1.0		2985		134	0.00			
			Ceil				3.2							
			Ceil Ceil				6.2	1.28		573 82.2				
			Ceil				0.2			1491				
			Ceil				11.2			88.0				
			Ceil	144			13.2		21.6	58.4	30.02			
			Ceil Ceil			1.0	7.3			153				
			Ceil				9.2			153 87.9				
25 10	3	5SU1	Ceil	ing	-34	1.0	5.4	144	4.6				453	
			Ceil	-			11.2							
25 16	.5	/501	Ceil	ıng	-36	1.0	6.1	130	15.7	74.1	11.60	18.53	443	

28 Oct 2009 13:58	ALPHA/BETA - 1.09 Page #2	2
Protocol #:25	Smears H-3 & C-14 User : EaglePicher / H-3 C-14	/ ES
P#PID S# SMPL_ID TIME	CPMAA:25% CPMBB:25% DPM1 DPM2 tSIE FLAG	
25 16 38SU1 Ceiling-37	1.0 5.2 148 3.6 260 14.00 3.61 434	
	1.0 1.2 551 0.0 0.0 3.47 0.00 448	
25 16 40SU1 Ceiling-39	1.0 6.6 122 22.2 57.2 11.22 26.58 412	
25 16 41SU1 Ceilina-40	1.0 5.2 148 1.6 561 14.68 1.13 440	

28 Oc	t 2009 14	:16		ALPHA/E	ETA -	1.0	9				Page #	1	
Proto	col #:24			Smears	H-3 8	C-1	4		User	: 1	EaglePicher	/ 1	ES
Time:	1.00												
Data Mod	e: Dual DPM		Nuclides: 3	H-14C	Quench S	Sets							
					Low B	inergy:	3H						
Backgrou	nd Subtract: 1st V	ial			High	Energy:	140						
	LL UL	LCR	25% B	KG									
Region A	0.0 - 12.0	0	0.0 8.3	30									
Region B	: 12.0 - 156	0	0.0 16.2	26									
Region C	0.0 - 0.0	0	0.0 0.0	00									
and any and a second	ndicator: tSIE/AEC td Terminator: Cou												
FSS Smea	rs in 20 ml Ultima	Gold											
Coincide	nce Time(ns): 18												
Delay Be	fore Burst(ns): No	real											
Protocol	Data Filename: C:	\EP\PRO	DT.DAT										
Count Da	ta Filename: C:\EP	\SDATA2	24.002										
			4-3	C-14	H-3	C-11	4						
P#PID S	SMPL ID	TIME	CPMAA: 25%	CPMBB:25%	DPM1	DPM2	tSIE	FLAG			(		
24 9	_	10.0	8.3 22.0	16.3 15.7			422	В	1	use	· d ·		
24 9 2	SU1-Floor#14	1.0	46.1 32.2	59.3 29.6	111.32	66.38	443	7 n	onta not saver		2 ( 40		
24 9 3	SU1-Floor#15	1.0	7.7 107	12.7 86.9	17.21	14.62	452	7		MOV	Ne -		
24 9 4	SU1-Floor#16	1.0	25.7 45.9	76.8 25.3	44.26	91.31	448	Thi	3 aver				
24 9 5	SUI-Floor#17	1.0	33.2 39.2	87.2 23.5	62.24	103.17	445	1 6	uoia.	•			
24 9 8	SUI-Floor#18	1.0	43.5 33.4	120.0 19.6	79.10	142.19	44£	1					

28 Oct	2009 1	4:53	5	ALPHA/	BETA	- 1.	09						Pag	e #1	
Protoc	ol #:11			Smears	H-3	& C-	14			Use	er :	Eagl	ePich	er /	ES
Time: 1.	00														
Data Mode:	Dual DPM		Nuclides:	3H-14C	Quenc	h Sets									
					Lo	w Energy	: 3H								
Background	Subtract: 1st	Vial			Hi	gh Energ	y: 14	3							
	LL UL	LCR	25%	BKG											
Region A:	0.0 - 12.0	0	0.0 1	0.73											
Region B:	12.0 - 156	0	0.0 1	5.07											
Region C:	0.0 - 0.0	0	0.0	0.00											
Quench Ind:	icator: tSIE/A	EC													
Ext Std	Terminator: Co	ount													
THE PERSON OF	in 20 ml Ulti	ma Gold	d												
	Time(ns): 18														
	re Burst(ns):														
	ata Filename: (														
Count Data	Filename: C:\	EP\SDA	MA11.003												
			H-3	C-14	H-3	C-14									
P#PID S#	SMPL_ID	TIME	CPMAA: 25%	CPMBB:25%	3H-DPM	14C-DPM	tSIE	FLAG							
11 3 1		10.0	10.7 19.3	15.1 16.3	0.00	0.00	412	В				(			
11 3 2	SU1 Wall 14	1.0	755.8 7.3	529.4 8.8	2021.22	537.10	43é	7	Date	not	115	ed.			
11 3 3	SU1 Wall 15	1.0	47.9 32.3	86.3 23.5	105.56			>	Dare			ed to			
11 3 4	SU1 Wall 16	1.0	79.3 24.1	177.9 15.7	170.64			1	This	a rea	mer	cd 10			
11 3 5	SUI Wall 17	1.0	30.2 42.9	59.0 29.5	64.67			)	5	4012					
11 3 6	SUI Wall 18	1.0	30.5 42.6	61.7 28.7	65.38	71.81	437	-		10					

### 4.3.2 SU002-East Building

This was a Class 3 survey unit.

Summary results are provided in Table 4-3 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

**Table 4-3 SU002 Summary Results** 

Summary Survey Unit 002 East Building, Class 3	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums* (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm <sup>2</sup> )
Number	120	6	120	120
Average	263	5,639	3.1	5.6
Standard Deviation	1,200	N/A	5.6	6.5
Maximum	7,996	8,461	23.5	33.9

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



### FSS Survey Package Worksheet for EaglePicher SU002

Package Identification No.: SU02F/SU02S	Prepared by: Paul C. Ely
Location: Building East Interior	Date Prepared: 9/30/2009
Area Classification: Class 3	Signature: Paul Ely

#### Area Description

The survey area includes the floor, walls and ceiling.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

#### **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - ε<sub>t</sub>, the total beta efficiency = ε<sub>i</sub> \* ε<sub>s</sub>
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 25% scan of floor and lower walls (6-feet and below), for beta contamination and 10% scan of upper walls
    and ceiling for beta contamination.
- 3. Perform direct beta surface activity measurements at each measurement location. All ceiling surveys locations are directly above marked floor survey locations. Wall measurement locations are determined by extending the survey grids from the floors up the walls and obtaining measurements at alternating elevations of 3-feet from the floor and 7-feet from the floor. Mark and the survey location on the walls with a felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the survey unit. Random survey locations were generated for this class 3 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm<sup>2</sup> in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Rev. 0

Survey Package Worksheet SU02F/SU02S (cont'd)

Sor Thr 3,00 Per pla: Cog	Source check instrumentation to C- The static MDC for total beta activi 3,000 dpm/100 cm². Perform a minimum of three one-m plastic shield on the survey surface. Log scan measurements or record r cpm on a Grid Scan Record.	nstruments C for total cm². mum of th n the surve	Source check instrumentation to C-14 for beta measurements.  The static MDC for total beta activity measurements shall be less than 3,000 dpm/100 cm <sup>2</sup> .  Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in cpm on a Grid Scan Record.	for beta	a measurer ements sh l backgrou can measi	ments. all be le nds usir urement	ss than ng the results in		Random the attach measuren location The attach (ceiling a	Randomly generated the attached survey is measurement location location on the map. The attached map pr (ceiling and wall loc	ey map. ey map. ation to tl ap. provide. locations	urement a If any loca he nearest s floor mei	Randomly generated measurement and sampling location the attached survey map. If any location is inaccessible, measurement location to the nearest usable location and location on the map.  The attached map provides floor measurement and samp (ceiling and wall locations are based on floor locations).	Randomly generated measurement and sampling locations are located on the attached survey map. If any location is inaccessible, offset the measurement location to the nearest usable location and mark the survey location on the map.  The attached map provides floor measurement and sampling locations (ceiling and wall locations are based on floor locations).	located on t the the survey
				Sur	Survey Performance (Initial and date as each item is completed)	rmance	(Initial a	nd date	as each i	tem is c	ompleted	(1			
	Location Codes	es												Smoon	
П	12	F.6	General	Scan	Survey Tech	Direct Beta	Survey Tech	Direct Alpha	Survey Tech	Alpha Scan	Survey Tech	Direct Gamma	Survey	Gross (Liq. Scint.)	Survey Tech
						Eagle	EaglePicher SU002 Class 3 Area	U002 C	lass 3 Are	ea					
Package ID	Surface or Structure	Material Code			Initial & Date	@60 sec	Initial & Date	@60 sec	Initial & Date		Initial & Date	@100 cm	Initial & Date	В	Initial & Date
SU02F	FL01	B0002	Floor	N/A	10-23-09	40	5 >	N/A	N/A	N/A	N/A	N/A	N/A	40	6.38-09
SU02S	FL01	B0002	Floor	25%	1623-69	N/A	NApre	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SU02F	W01	B0004	Walls	N/A	63.86.01	40	60-8-01	N/A	N/A	N/A	N/A	N/A	N/A	40	65
SC002S	W01	B0004	Lower	25%	10-27-09	N/A	NAPRE	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SU02F	C01	B0012	Ceiling	N/A	30 HM	40	(S) (P30)	NA	N/A	N/A	N/A	N/A	N/A	40	10-39-09
SU02S	C01	B0012	Ceiling	10%	STA TOTAG	N/A	3 NAN	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

kag kag			Surv	Survey Performance (Initial and date as each item is completed)	mance (	(Initial a	nd date	as each i	tem is co	ompleted	6			
Survey Comments    1.2   L6   Description   Scan   Tech   Beta   Tech   Scan   Tech   Gamma   Tech   Te	Location Codes	Comme	D. C.	0		C					i		Smear	
Survey Comments  Survey Comments  Survey Comments  Package Review  Package Completed: 10/28/09  Rage Review by and Date (Signature): Man CR, 12/22/09	17	Description	Scan	Tech	Beta	Tech	Alpha	Tech	Scan	Tech	Gamma	Survey	Gross (Liq. Scint.)	Survey Tech
Survey Comments  Survey Comments  Package Review  Package Completed: 10/28/09  Rage Review by and Date (Signature): MacMC Etc. 12/32/09														
Survey Comments  Survey Comments  Package Review  Package Review  Package Comments  Package Review  Package Completed: 10/38/69  Survey Comments  Package Review by and Date (Signature): 10/38/69														
Survey Comments  Survey Comments  Package Review  Package Review  Package Review  Package Completed: 10/38/09  Rage Review by and Date (Signature):   Package Review by and Date (Signature):   Packag														
Survey Comments  Survey Comments  Package Review  Package Review  Package Completed: 10/34/09  Rage Review by and Date (Signature):   May Review by an and Date (Signature):   May Review by an and Date (Signature):   May Review by an an analysis of the Bate (Signature):   May Review by an an analysis of the Bate (Signature):   May Review by an an analysis of the Bate (Signature):   May Review by a second by a seco														
Survey Comments  Package Review  Package Completed: 10/38/09  kage Review by and Date (Signature):   Mackage Review by Bate Review by B														
Survey Comments  Package Review  Package Revie														
Package Review  Package Review						Survey	Comme	nts						
Package Review  Package Review														
veyor(s) Signatures: Xu Lu , Mouer McBuorne Roby Lang, Charage Review by and Date (Signature): How C En 12/22/69														
veyor(s) Signatures: Lu Lu , Down McMorne Roby M. Ch. Ch. Rage Review by and Date (Signature): Roll Ed. (2/32/69														
veyor(s) Signatures: Lu Lu Judon Malkone, Roly Party, Charles Recompleted: 10/28/09 kage Review by and Date (Signature): Roll Ed., 12/22/69						Packag	ge Revie	A						
kage Review by and Date (Signature): flux El. 12/12/69	Surveyor(s) Signatures: Date Package Completed:	1 4 h X	7 60	1	John	BURG	Reome	6	acha /	Se		4		
	Package Review by and Date	e (Signature):	A	ou Bull	San	12/	22/69							
					0									
	Rev. 0													Jan 2 062

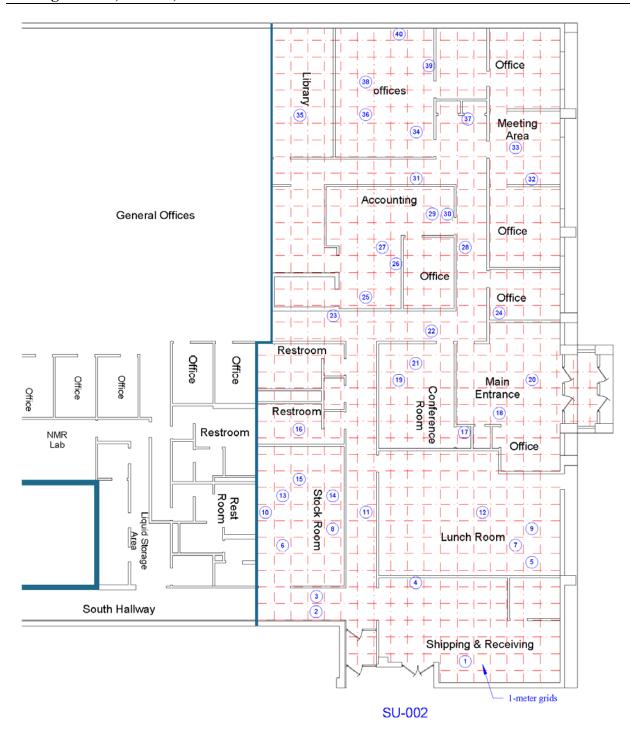


Figure 4-2 SU002 Survey Map

EaglePicher FSS Data Sheet Survey Unit 002 East Building

		Detector				
Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Ludlum 43-68 (beta)	091028	126	9/30/10	2350-1	117566	9/30/10
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

			В	eta	H-3	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )				
1	F	Floor	2,005	60,000	0.0	6,000	4.0
2	F	Floor	1,804	60,000	0.0	6,000	29.7
3	F	Floor	1,952	60,000	0.0	6,000	4.6
4	F	Floor	1,103	60,000	1.8	6,000	6.6
5	F	Floor	1,358	60,000	0.0	6,000	20.2
6	F	Floor	2,812	60,000	0.0	6,000	19.6
7	F	Floor	615	60,000	0.0	6,000	2.1
8	F	Floor	1,719	60,000	0.0	6,000	1.2
9	F	Floor	1,878	60,000	0.0	6,000	8.0
10	F	Floor	1,358	60,000	3.4	6,000	4.2
11	F	Floor	2,557	60,000	0.0	6,000	33.9
12	F	Floor	743	60,000	0.0	6,000	14.1
13	F	Floor	2,005	60,000	0.0	6,000	18.1
14	F	Floor	1,687	60,000	0.0	6,000	18.8
15	F	Floor	1,390	60,000	0.0	6,000	10.2
16	F	Floor	297	60,000	0.0	6,000	11.7
17	F	Floor	355	60,000	0.0	6,000	10.1
18	F	Floor	1,946	60,000	0.0	6,000	12.7
19	F	Floor	296	60,000	0.0	6,000	3.9
20	F	Floor	1,675	60,000	0.0	6,000	13.9
21	F	Floor	381	60,000	0.0	6,000	3.9
22	F	Floor	288	60,000	0.0	6,000	6.5
23	F	Floor	1,396	60,000	0.0	6,000	12.3
24	F	Floor	1,591	60,000	0.0	6,000	4.1
25	F	Floor	1,176	60,000	0.0	6,000	10.1
26	F	Floor	652	60,000	0.0	6,000	8.5
27	F	Floor	939	60,000	0.0	6,000	9.8
28	F	Floor	482	60,000	0.0	6,000	6.1
29	F	Floor	592	60,000	9.3	6,000	20.5
30	F	Floor	702	60,000	1.0	6,000	8.6
31	F	Floor	567	60,000	11.3	6,000	15.1
32	F	Floor	728	60,000	0.0	6,000	2.6
33	F	Floor	550	60,000	0.0	6,000	11.4
34	F	Floor	1,058	60,000	0.0	6,000	7.6
35	F	Floor	93	60,000	0.0	6,000	12.4
36	F	Floor	415	60,000	0.0	6,000	8.1
37	F	Floor	423	60,000	0.0	6,000	13.6
38	F	Floor	821	60,000	0.0	6,000	6.2
39	F	Floor	533	60,000	0.0	6,000	16.3
40	F	Floor	1,185	60,000	0.0	6,000	6.0
Average	F	Floor	1,103		0.7		10.9
Standard Deviation	F	Floor	686		2.3		7.2
Maximum	F	Floor	2,812		11.3		33.9

EaglePicher FSS Data Sheet Survey Unit 002 East Building

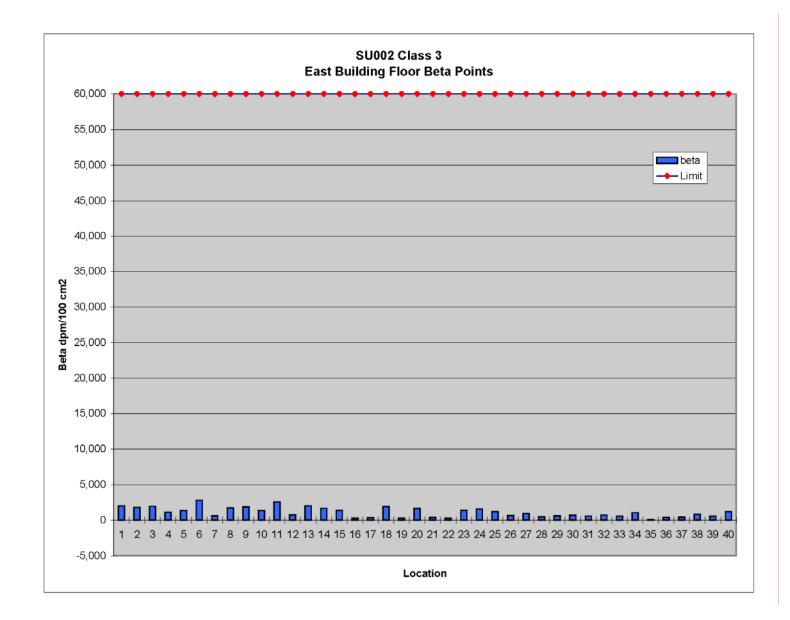
		Detector				
Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Ludlum 43-68 (beta)	091028	126	9/30/10	2350-1	117566	9/30/10
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

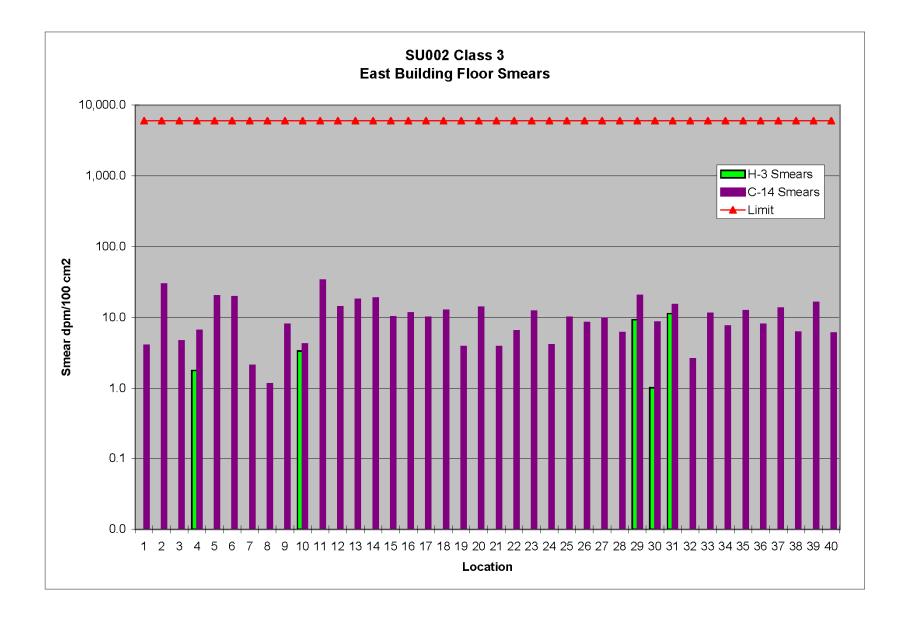
			В	eta	H-	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup>
1	С	Ceiling	839	60,000	14.1	6,000	6.6
2	С	Ceiling	373	60,000	0.0	6,000	13.8
3	С	Ceiling	361	60,000	0.4	6,000	3.9
4	С	Ceiling	105	60,000	0.0	6,000	5.3
5	С	Ceiling	-291	60,000	0.0	6,000	1.5
6	С	Ceiling	268	60,000	11.5	6,000	4.5
7	С	Ceiling	-23	60,000	1.5	6,000	0.2
8	С	Ceiling	-781	60,000	19.3	6,000	11.9
9	С	Ceiling	-70	60,000	0.0	6,000	0.2
10	С	Ceiling	256	60,000	0.0	6,000	9.0
11	С	Ceiling	NA	60,000	9.3	6,000	13.0
12	С	Ceiling	NA	60,000	5.0	6,000	8.4
13	С	Ceiling	501	60,000	3.2	6,000	3.8
14	С	Ceiling	-93	60,000	7.0	6,000	3.2
15	С	Ceiling	-268	60,000	21.8	6,000	0.0
16	С	Ceiling	862	60,000	0.0	6,000	0.0
17	С	Ceiling	-210	60,000	0.0	6,000	9.0
18	С	Ceiling	478	60,000	12.3	6,000	2.1
19	С	Ceiling	117	60,000	12.9	6,000	0.8
20	С	Ceiling	163	60,000	0.0	6,000	0.1
21	С	Ceiling	-128	60,000	19.4	6,000	6.6
22	С	Ceiling	-70	60,000	2.8	6,000	14.7
23	С	Ceiling	256	60,000	0.0	6,000	7.4
24	С	Ceiling	-606	60.000	0.0	6.000	0.0
25	С	Ceiling	385	60,000	0.0	6,000	6.1
26	С	Ceiling	175	60,000	1.1	6,000	1.4
27	С	Ceiling	-268	60,000	0.0	6,000	0.3
28	С	Ceiling	256	60,000	3.7	6,000	2.5
29	С	Ceiling	210	60,000	10.6	6,000	0.0
30	С	Ceiling	35	60,000	0.0	6,000	0.3
31	С	Ceiling	47	60,000	0.0	6,000	0.0
32	С	Ceiling	396	60,000	0.0	6,000	3.9
33	С	Ceiling	175	60,000	0.0	6,000	2.9
34	С	Ceiling	-221	60,000	1.4	6,000	11.0
35	С	Ceiling	47	60,000	16.1	6,000	8.0
36	С	Ceiling	385	60,000	22.7	6,000	13.7
37	С	Ceiling	210	60,000	0.0	6,000	0.0
38	С	Ceiling	105	60,000	0.0	6,000	6.5
39	С	Ceiling	175	60,000	0.0	6,000	0.0
40	C	Ceiling	711	60,000	0.0	6,000	12.3
Average	C	Ceiling	128		4.9	·	4.9
Standard Deviation	č	Ceiling	344		7.2		4.7
Maximum	C	Ceiling	862		22.7		14.7

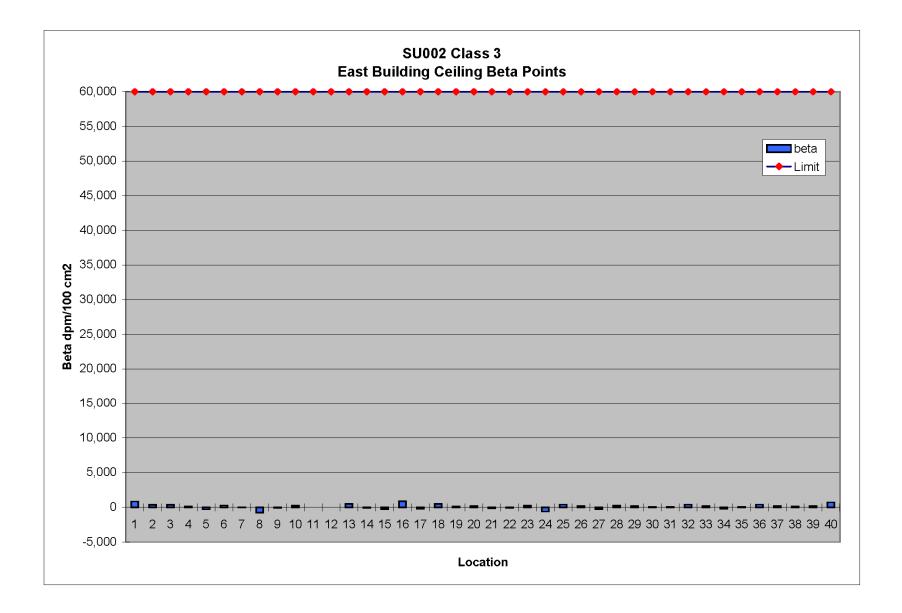
EaglePicher FSS Data Sheet Survey Unit 002 East Building

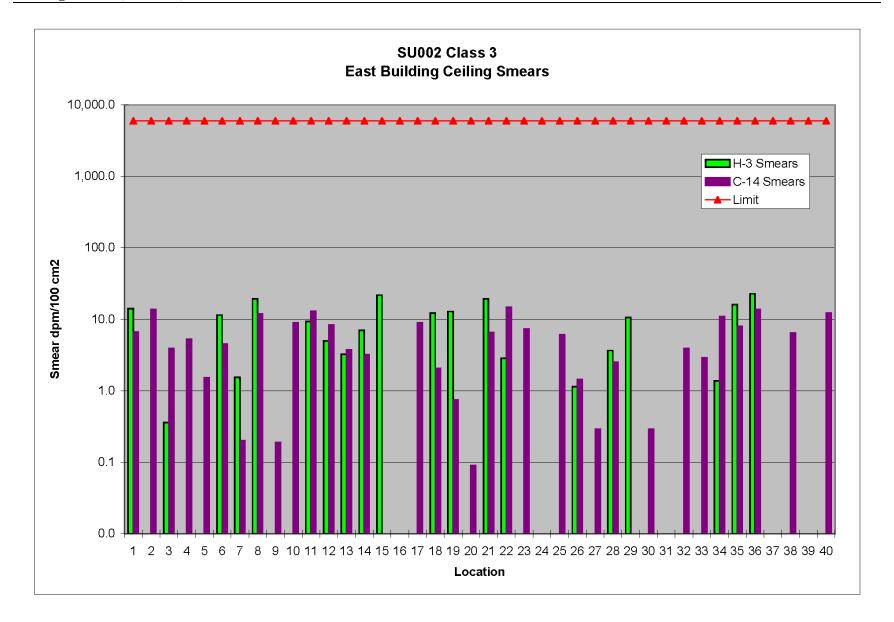
		Detector				
Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Ludlum 43-68 (beta)	091028	126	9/30/10	2350-1	117566	9/30/10
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

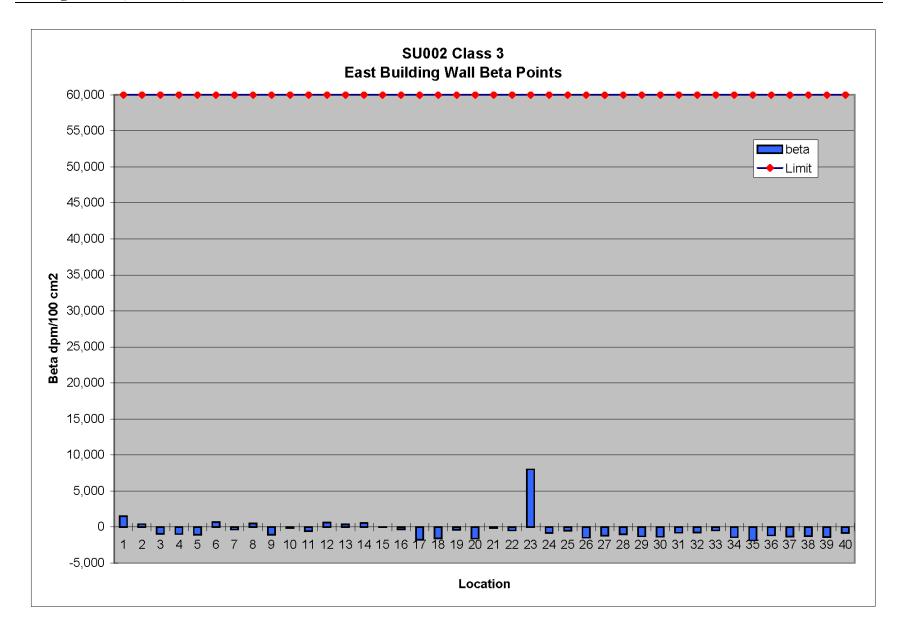
				eta	H-S		C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup>
1	W	Walls	1,496	60,000	0.0	6,000	0.0
2	W	Walls	403	60,000	1.1	6,000	0.0
3	W	Walls	-944	60,000	0.0	6,000	0.0
4	W	Walls	-987	60,000	5.6	6,000	0.0
5	w	Walls	-1,093	60,000	2.9	6,000	0.0
6	W	Walls	679	60,000	0.0	6,000	0.7
7	W	Walls	-350	60,000	8.4	6,000	0.0
8	W	Walls	488	60,000	0.0	6,000	0.0
9	W	Walls	-1,061	60,000	0.0	6,000	0.0
10	W	Walls	-159	60,000	2.5	6,000	0.0
11	W	Walls	-562	60,000	4.0	6,000	0.0
12	w	Walls	626	60,000	0.0	6,000	3.8
13	W	Walls	361	60,000	10.1	6,000	7.9
14	W	Walls	552	60,000	0.0	6,000	2.2
15	w	Walls	-42	60,000	0.0	6,000	6.1
16	W	Walls	-318	60,000	5.4	6,000	0.0
17	W	Walls	-1,777	60,000	0.0	6,000	0.1
18	W	Walls	-1,582	60,000	0.0	6,000	0.0
19	w	Walls	-406	60,000	5.7	6,000	0.0
20	w	Walls	-1,616	60,000	0.0	6,000	6.3
21	w	Walls	-169	60,000	0.0	6,000	0.0
22	w	Walls	-488	60,000	0.0	6,000	0.0
23	w	Walls	7,996	60,000	10.9	6,000	4.2
24	w	Walls	-812	60,000	0.0	6.000	2.0
25	W	Walls	-499	60,000	0.0	6,000	1.2
26	W	Walls	-1,489	60,000	0.0	6,000	0.0
27	W	Walls	-1,185	60,000	6.7	6,000	4.6
28	W	Walls	-1,032	60,000	0.0	6,000	0.0
29	W	Walls	-1,303	60,000	15.9	6,000	0.0
30	W	Walls	-1,362	60,000	6.9	6,000	1.3
31	W	Walls	-795	60,000	0.0	6,000	0.0
32	W	Walls	-770	60,000	0.0	6,000	0.0
33	W	Walls	-482	60,000	23.5	6,000	12.0
34	W	Walls	-1,413	60,000	7.3	6,000	11.9
35	W	Walls	-1,853	60,000	7.3	6,000	0.0
36	W	Walls	-1,168	60,000	4.6	6,000	0.0
37	W	Walls	-1,328	60,000	0.0	6,000	0.0
38	W	Walls	-1,286	60,000	0.0	6,000	0.0
39	W	Walls	-1,379	60,000	0.0	6,000	0.0
40	W	Walls	-829	60,000	0.0	6,000	0.0
Average			-448		3.2		1.6
Standard Deviation			1.574		5.1		3.1
Maximum			7,996		23.5	1	12.0

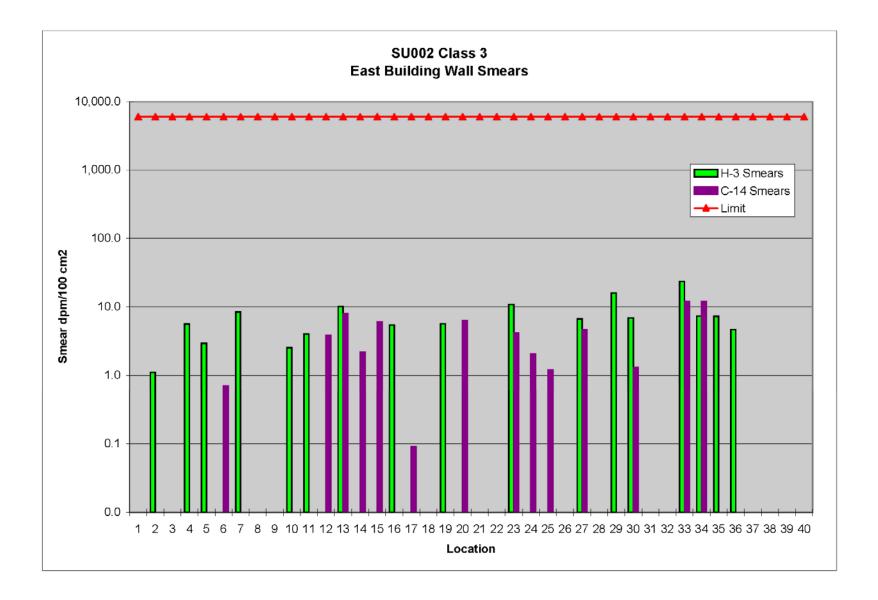














M2350-1 Download BETA Report

Lee Severtson Print Name	Luhr	10-9-23-09
Maximum Net DPM Observed: 46643	STDEV Observed: 13720	# of Samples Taken: 21
Minimum Net DPM Observed: -1093	Mean Net DPM: 5132	
Detector Area : 126	Efficiency: 0.0748	Survey Date : 10/22/2009
Measurement Type : BETA	Detector Type: 02200: 126 cm2	Gas Proportional Detector
Detector Model : 43-68b	Detector S/N : 091028	Detector Cal. Due ; 9/30/2010
Instrument Model 2350-1	Instrument S/N: 117566	Instrument Cal. Due : 9/28/2010
User ID : RLS2098	Technician Name Lee Severtso	n
Survey Reason : Final Status		
	ription :SU02F 1,2,3,4,5,9,11 floors a	and walls

Comments:

Sign-Off Page 10/30/09
Print Name Page of 2

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ID(L1)	(L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
ZZZZZ	ZZZZZ	0	2,849.0	600	PRBBK	B9999	22222	1	0	3,023
77777	ZZZZZ	1	4,396.0	60	PRSC1	B9999	ZZZZZ	1	0	46,643
SU02F	FL01	2	410.0	60	FLDBK	B002	77777	1	392	191
SU02F	FL01	3	581.0	60	FLCT	B002	27222	Y.	392	2,005
SU02F	FL01	4	496.0	60	FLCT	B002	27272	d	392	1,103
SU02F	Wot	5	299.0	60	FLCT	B004	22222	4	392	-987
SU02F	W01	6	533.0	60	FLCT	6004	ZZZZZ	1	392	1,496
SU02F	FL01	7	409.0	80	FLDBK	B0002	22777	2	392	180
SU02F	FL01	В	562.0	60	FLDCT	B0002	ZZZZZ	2	392	1,804
SU02F	FL01	9	576.0	60	FLDCT	B0002	22272	3	392	1,952
SU02F	Wor	10	354.0	60	FLDCT	B0004	22222	2	392	-403
SU02F	W01.	11	303.0	60	FLOCT	80004	77777	3	392	-944
SU02F	WOT	12	339.0	60	FLDCT	B0004	22222	11	392	-562
SU02F	FL01	13	633.0	60	FLOCT	B0002	22272	11	392	2,557
SU02F	FL01	14	520.0	60	FLDCT	80002	27777	5	392	1,358
SUDZE	FL01	15	569.0	60	FLDCT	B0002	22222	9	392	1,878
SU02F	W01	16	289.0	60	FLDCT	80004	27777	5	392	-1,093
SU02F	W01	17	292,0	60	FLDCT	B0004	22772	9	392	-1,061
SU02F	FL01	18	373.0	60	FLDBK	80002	22222	9	392	-202
7.272	72777	19	2.920.0	600	PTBBK	89999	22222	T	0	3,098
2222	22222	50	4,311,0	60	PTSC1	89999	ZZZZZ	2	W.	45,741

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Friday, October 23, 2009



M2350-1 Download BETA Report

	ription:SU02F 22,23,24,25 floors ar	id walls			
Survey Reason : Final Status					
User ID : RPS2366	Technician Name : Richard Stor	ley			
Instrument Model : 2350-1	Instrument S/N : 95359	Instrument Cal. Due : 9/30/2010			
Detector Model : 43-68b	Detector S/N: 119337	Detector Cal. Due : 9/30/2010			
Measurement Type : BETA	Detector Type : 02200 : 126 cm2 Gas Proportional Detector				
Detector Area : 126	Efficiency: 0.0938	Survey Date : 10/22/2009			
Minimum Net DPM Observed: -812	Mean Net DPM: 6681				
Maximum Net DPM Observed: 38092	STDEV Observed: 13310	# of Samples Taken: 14			
Richard Stoney	Keld P. St.	10-23-2009			
Print Name	Signature	Date			
Print Name	Signature	Date			

Comments:			
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Page \_\_\_\_ of \_\_ 2

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Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
ZZZZZ	ZZZZZ	0	3,467.0	600	PRBBK	B9999		1	0	2,933
ZZZZZ	ZZZZZ	1	4,502.0	60	PRSC1	B9999	77777	1	0	38,092
SU02F	FL01	2	413.0	60	FLDBK	B0002	22222	22	379	288
SU02F	FL01	3	541.0	60	FLDCT	B0002	22222	22	379	1,371
SU02F	W01	4	326.0	60	FLDCT	B0004	22222	22	379	-448
SU02F	FL01	5	544 0	60	FLDCT	80002	22272	23	379	1,398
SU02F	VV01	5	1,324.0	60	FLDCT	B0004	ZZZZZ	23	378	7,996
SU02F	FL01	7	567.0	50	FLDCT	B0002	77777	24	379	1,591
SU02F	VV01	8	283.0	60	FLDCT	B0004	77777	24	379	-812
SU02F	FL01	9	518.0	60	FLOCT	B0002	27777	25	379	1,176
SU02F	Wot	10	320.0	80	FLDCT	B0004	ZZZZZ	25	379	-499
SU02F	Wot	11	439.0	60	FLDBK	B0004	22222	28	379	508
22272	22222	12	3,182.0	500	PTBBK	B9999	22772	1	0	2,692
ZZZZZ	77777	13	4,403.0	60	PTSC1	B9999	77777	7	D	37,254

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Friday, October 23, 2009



#### M2350-1 Download BETA Report

File Name : 00000027 Survey Descr	ription :SU02F points 17-21,26-40 F	loor and walls			
Survey Reason : Final Status					
User ID : RPS2366	Technician Name : Richard Stor	ney			
Instrument Model : 2350-1	Instrument S/N : 95359	Instrument Cal. Due : 9/30/2010			
Detector Model : 43-68b	Detector S/N : 119337	Detector Cal. Due : 9/30/2010			
Measurement Type : BETA	Detector Type: 02200 : 126 cm2 Gas Proportional Detector				
Detector Area : 126	Efficiency: 0.0938	Survey Date : 10/23/2009			
Minimum Net DPM Observed: -1853	Mean Net DPM: 665				
Maximum Net DPM Observed: 35393	STDEV Observed: 5404	# of Samples Taken; 45			
Richard Stoney	Richal Patr	- 10-23-2009			
Print Name	Signature	Date			
Print Name	Signature	Date			

omments: All Scan results < 1000 cpm							
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Download File Name: 00000027

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
77777	ZZZZZ	0	2,987.0	600	PRBBK	B9999	ZZZZZ	2	0	2,527
ZZZZZ	ZZZZZ	1	4,183.0	60	PRSC1	B9999	22272	3	0	35,393
SU02F	FL01	2	456.0	60	FLDBK	80002	22222	26	464	-08
SU02F	FL01	3	541 0	60	FLDCT	B0002	ZZZZZ	26	464	652
SU02F	VV01	4	288.0	60	FLDCT	B0004	27272	26	464	-1,489
SU02F	FL01	5	575.0	60	FLDCT	B0002	27777	27	464	939
SU02F	W01	6	324.0	50	FLOCT	B0004	77777	27	464	-1,185
SU02F	W01	7	342.0	60	FLDCT	B0004	ZZZZZ	28	464	-1,032
SU02F	FL01	8	521.0	60	FLDCT	B0002	22222	28	464	482
SU02F	FL01	9	534.0	60	FLDCT	80002	ZZZZZ	29	464	592
SU02F	WD1	10	310.0	60	FLDCT	B0004	ZZZZZ	29	464	-1,303
SU02F	WD1	11	303.0	60	FLDCT	B0004	22222	30	464	-1,362
SU02F	FL01	12	547.0	60	FLDCT	B0002	27777	30	464	702
SU02F	PL01	13	531.0	60	FLDCT	80002	22222	31	464	567
SU02F	W01	14	370.0	60	FLDCT	B0004	22222	31	464	-795
SU02F	WOI	15	373.0	60	FLDCT	80004	22222	32	464	-770
SU02F	FL01	15	550.0	60	FLDCT	B0002	ZZZZZ	32	464	728
SU02F	FL01	17	529.0	60	FLDCT	80002	22772	33	464	550
SU02F	W01	18	407:0	60	FLOCT	B0004	27777	33	464	482
SU02F	W01	19	297.0	60	FLDCT	B0004	22772	34	464	-1,413
SU02F	FL01	20	589.0	60	FLDCT	B0002	ZZZZZ	34	464	1,058
SU02F	FL01	21	475.0	60	FLDCT	B0002	22222	35	464	93
SU02F	Wo1	22	245.0	60	FLOCT	B0004	77777	35	464	-1,853
SU02F	W01.	23	326.0	60	FLDCT	B0004	27777	36	464	-1,168
SU02F	FL01	24	513.0	80	FLDCT	80002	22222	36	464	415
SU02F	FL01	25	514.0	60	FLDCT	B0002	27777	37	464	423
SU02F	FL01	26	566.0	60	FLDCT	B0002	27777	38	464	863
SU02F	WOI	27	307.0	60	FLOCT	B0004	22222	37	464	-1,328
SU02F	W01	28	312.0	60	FLDCT	B0004	27277	38	464	-1,286
SU02F	FL01	30	527.0	80	FLDCT	80002	ZZZZZ	39	464	533
SU02F	W01	31	301.0	60	FLDCT	B0004	77777	39	464	-1,379
SU02F	W01	32	366.0	60	FLDCT	B0004	22222	40	464	-829
SU02F	FL01	33	604.0	60	FLDCT	B0002	27727	40	464	1,185
SU02F	FL01	34	506.0	60	FLDCT	B0002	27777	17	464	355
SU02F	FL01	35	499.0	60	FLOCT	B0002	22727	19	464	296
SU02F	FL01	36	509.0	60	FLOCT	80002	22222	21	464	381
SU02F	W01	37	254.0	60	FLDCT	B0004	77777	17	464	-1,777
SU02F	W01	38	416.0	60	FLDCT	B0004	77777	19	464	-406
SU02F	W01	39	444.0	60	FLDCT	B0004	27777	21	464	-169

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Friday, October 23, 2009

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU02F	FL01	40	694.0	60	FLDCT	B0002	77777	18	464	1,946
SU02F	FL01	41	662.0	60	FLDCT	B0002	77777	20	464	1,675
SU02F	W01	42	277.0	60	FLDCT	B0004	22222	18	464	-1,582
SU02F	W01	43	273.0	60	FLDCT	B0004	27272	20	464	-1,616
SU02F	W01	44	472.0	60	FLDBK	B0004	ZZZZZ	21	464	68

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Friday, October 23, 2009		A STATE OF THE STA	Page 3 of 3



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Maximum Net DPM Observed: 39042 Sharon McChesney	STDEV Observed: 7124  Shaver McChary Signature	# of Samples Taken: 30			
Minimum Net DPM Observed: -1239	Mean Net DPM: 1382				
Detector Area : 126	Efficiency : 0.0681 Survey Date : 10/27/2009				
Measurement Type : BETA	Detector Type : 02200 : 126 cm2 Gas Proportional Detector				
Detector Model : 43-68b	Detector S/N: 095523	Detector Cal. Due : 9/30/2010			
Instrument Model : 2350-1	Instrument S/N : 80502	Instrument Cal. Due : 9/30/2010			
User ID : SXM1098	Technician Name : Sharon McCi	hesney			
Survey Reason : Final Status					

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Page 1 of 2

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Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU02F	C01	0	2,377.0	600	PRBBK	B0012	15	2	344	-1,239
SU02F	C01	1	3,694.0	60	PRSC1	B0012	22272	1	344	39,042
SU02F	C01	2	291.0	60	FLDBK	B0012	77777	1	344	-618
SU02F	C01	3	418.0	60	FLDCT	B0012	ZZZZZ	16	344	862
SU02F	C01	4	326.0	60	FLDCT	B0012	ZZZZZ	17	344	-210
SU02F	C01	5	354.0	60	FLDCT	B0012	ZZZZZ	19	344	117
SU02F	C01	6	333.0	60	FLDCT	B0012	27777	21	344	-128
SU02F	C01	7	385.0	60	FLDCT	B0012	22222	18	344	478
SU02F	C01	8	358.0	60	FLDCT	B0012	77777	20	344	163
SU02F	C01	9	292.0	60	FLDCT	B0012	ZZZZZ	24	344	-606
SU02F	C01	10	338.0	60	FLDCT	B0012	ZZZZZ	22	344	-70
SU02F	C01	11	366.0	60	FLDCT	B0012	ZZZZZ	23	344	256
SU02F	C01	12	366.0	60	FLDCT	B0012	ZZZZZ	28	344	256
SU02F	C01	13	362.0	60	FLDCT	B0012	77777	29	344	210
SU02F	C01	14	347.0	60	FLDCT	B0012	77777	30	344	35
SU02F	C01	15	359.0	60	FLDCT	B0012	27777	26	344	175
SU02F	C01	16	321.0	60	FLDCT	B0012	ZZZZZ	27	344	-268
SU02F	C01	17	377.0	60	FLDCT	B0012	ZZZZZ	25	344	385
SU02F	C01	18	362.0	60	FLDCT	B0012	22222	37	344	210
SU02F	C01	19	359.0	60	FLDCT	B0012	77777	33	344	175
SU02F	C01	20	378.0	60	FLDCT	80012	ZZZZZ	32	344	396
SU02F	C01	21	325.0	60	FLDCT	B0012	22222	34	344	-221
SIJ02F	C01	22	370.0	60	FLOBK	B0012	27777	2	344	303
SU02F	C01	23	377.0	60	FLOCT	80012	ZZZZZ	36	344	385
SU02F	C01	24	353.0	60	FLDCT	B0012	22222	38	344	105
SU02F	CQ1	25	359.0	80	FLDCT	B0012	ZZZZZ	39	344	175
SU02F	CQ1	26	405.0	50	FLDCT	80012	22727	40	344	711
SU02F	C01	27	348,0	60	FLDCT	80012	22222	31	344	47
SU02F	C01	28	348.0	60	FLOCT	B0012	27272	35	344	47
SU02F	001	29	370.0	60	FLDBK	B0012	ZZZZZ	3	344	303

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Tuesday, October 27, 2009

Page Z of Z



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Survey Reason : Final Status User ID : SXM1098	Technician Name : Sharon McC	hesney		
Instrument Model : 2350-1	Instrument S/N : 80502	Instrument Cal. Due : 9/30/2010		
Detector Model : 43-68b	Detector S/N: 095523	Detector Cal. Due : 9/30/2010		
Measurement Type : BETA	Detector Type: 02200: 126 cm2 Gas Proportional Detector			
Detector Area : 126	Efficiency: 0.0681	Survey Date : 10/26/2009		
Minimum Net DPM Observed: -781	Mean Net DPM: 2325			
Maximum Net DPM Observed: 41268	STDEV Observed: 9727 # of Samples Taken:			
Sharon McChesney Print Name	Thair Mylen Signature	75 10-26-09 Date		
Print Name	Signature	Date		

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	some constraints			
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Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU02F	C01	0	312.0	60	FLDBK	B0012	1	1	351	-455
SU02F	C01	1	423.0	60	FLDCT	B0012	1	1	351	839
SU02F	C01	2	383.0	60	FLDCT	B0012	2	2	351	373
SU02F	C01	3	382.0	60	FLDCT	B0012	3	3	351	361
SU02F	C01	4	360.0	60	FLOCT	B0012	4	4	351	105
SU02F	C01	5	326.0	60	FLDCT	B0012	5	5	351	-291
SU02F	C01	6	374.0	60	FLDCT	B0012	6	6	351	268
SU02F	C01	7	349.0	60	FLDCT	80012	7	7	351	-23
SU02F	C01	8	284.0	60	FLDCT	B0012	В	8	351	-781
SU02F	C01	9	345.0	60	FLDCT	B0012	9	9	351	-70
SU02F	C01	10	373.0	60	FLDCT	B0012	10	10	351	256
SU02F	C01	11	394.0	60	FLDCT	B0012	13	13	351	501
SU02F	C01	12	343.0	60	FLDCT	B0012	14	14	351	-93
SU02F	C01	13	358.0	60	FLOBK	B0012	15	2	351	82
SU02F	C01	14	328.0	60	FLDCT	80012	15	15	351	-268
SU02F	C01	15	384.0	60	FLDBK	80012	15	3	351	385
SU02F	C01	16	2,991.0	600	PTBBK	80012	15	1	351	-605
SU02F	C01	17	3,892,0	80	PTSC1	B0012	1.5	1	351	41,288

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Tuesday, October 27, 2009

Page Z of Z



### M2350-1 Download BETA Report

	ription :SU02F 6-8,10,12-16 Floor a	nu wans		
Survey Reason : Final Status				
User ID : RLS2098	Technician Name : Lee Severtson			
Instrument Model : 2350-1	Instrument S/N: 117566 Instrument Cal. Due: 9/			
Detector Model : 43-68b	Detector S/N: 091028	Detector Cal. Due : 9/30/2010		
Measurement Type : BETA	Detector Type : 02200 : 126 cm2	Gas Proportional Detector		
Detector Area : 126	Efficiency: 0.0748	Survey Date : 10/23/2009		
Minimum Net DPM Observed: -859	Mean Net DPM: 2609			
Maximum Net DPM Observed: 43460	STDEV Observed: 8951 # of Samples Taken: 23			
Lee Severtson	4.1-	9-12-09		
Print Name	Signature	9-13-09 Date		

Comments:			
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# Duratek Beta Survey Report

Download File Name: 00000028

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
ZZZZZ	ZZZZZ	0	1,958.0	600	PRBBK	B9999	ZZZZZ	2	0	2,077
ZZZZZ	ZZZZZ	1	4,096.0	60	PRBBK	B9999	ZZZZZ	3	0	43,460
SU02F	FL01	2	321,0	60	FLDBK	B0002	27277	7	218	1,093
SU02F	FL01	3	276.0	60	FLDCT	B0002	27777	7	218	615
SU02F	FL01	4	288.0	60	FLDCT	B0002	22222	12	218	743
SU02F	W01	5	185.0	60	FLDCT	B0004	27777	7	218	350
SU02F	VV01	6	277.0	60	FLDCT	B0004	27272	12	218	826
SU02F	FL01	7	483.0	60	FLDCT	B0002	77777	6	218	2,812
SU02F	FL01	8	380.0	60	FLDCT	B0002	22272	8	218	1,719
SU02F	FL01	9	346.0	60	FLDCT	B0002	77272	10	218	1,358
SU02F	FL01	10	407.0	60	FLOCT	B0002	22777	13	218	2,005
SU02F	FL01	11	377.0	60	FLOCT	B0002	22222	14	218	1,687
SU02F	FL01	12	349.0	60	FLDCT	80002	77777	15	218	1,390
SU02F	W01	13	282.0	80	FLOCT	80004	22772	6	218	679
SU02F	W01	14	264.0	60	FLDCT	B0004	ZZZZZ	8	218	488
SU02F	VV01	15	203.0	.60	FLDCT	B0004	ZZZZZ	10	218	-159
SU02F	W01	16	252.0	60	FLDCT	B0004	27777	13	218	361
SU02F	WOt	17	270,0	60	FLDCT	80004	22222	14	218	552
SU02F	W01.	18	214.0	60	FLOCT	80004	77777	15	218	-42
SU02F	FLO1	19	196.0	60	FLDBK	B0002	ZZZZZ	15	218	-233
SU02F	FL01	20	246.0	50	FLDCT	B0002	77777	16	218	297
SU02F	Wot	21	188.0	60	FLDCT	B0004	ZZZZZ	18	218	-318
SU02F	FL01	22	137.0	60	FLDBK	B0002	77777	18	218	-859

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Friday, October 23, 2009

Page Z of Z

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25 Oct 2009 10:21
                                    ALPHA/BETA - 1.09
                                                                                                  Page #1
Frotocol #:11
                                     Smears H-3 & C-14
                                                                               User : EaglePicher / ES
Time: 1.00
Data Mode: Dual DPM
                         Nuclides: 3H-14C
                                               Quench Sets
                                                 Low Energy: 3H
Background Subtract: 1st Vial
                                                 High Energy: 140
           LL
                     LCR
                           25%
                                   BKG
Region A: 0.0 - 12.0
                                 11.70
                     0
                           0.0
Region 9: 12.0 - 156
                     0
                           0.0
                                 10.90
Region C: 0.0 - 0.0
                      0
                           0.0
                                  0.00
Quench Indicator: tSIE/AEC
 Ext Std Terminator: Count
FSS Smears in 20 ml Ultima Gold
Coincidence Time(ns): 18
Delay Before Burst(ns): Normal
Protocol Data Filename: C:\EP\PROT.DAT
Count Data Filename: C:\EP\SDATA11.DAT
             SMPL_ID TIME CPMA A:25% CPMB B:25%
P# PID S#
                                                    DPM1
                                                          DPM2 tSIE FLAG
                     10.00
                           11.70 18.49
                                       10.90 19.16
                                                              969.56 B
    1 2
              SU2 F1 1.00
                           0.00 0.00
                                       3,19 244.5
                                                    0.00
                                                          4.03 354.78
11
              8U2 F2
9U2 F3
                            0.00 0.00
0.00 0.00
                                       22.90 51.58
                                                  0.00 29.70 274.18
                     1.00
                     1.00
                                        3.58 220.4 0.00
                                                         4.64 277.10
              SU2 F4
                     1.00
                            1.11 672.2
                                        5.29 157.2
                                                    1.78
                                                         6.56 302.41
              SU2 F5 1,00
    1 7
                            0.00 0.00
                                       15.58 67.40
                                                   0.00 20.22 273.10
             SU2 F4 1.00
11 1 7
                           0.00 0.00 15.10 48.94
                                                  0.00 19.63 269.05
             SU2 F7
                     1.00
                            0.00 0.00
                                       1.64 450.7
                                                   0.00 2.10 302.77
              SU2 F8
                             0.00 0.00
                                       0.91 793.4
                                                   0.00
                                                          1.45 321.65
11
                     1.00
                                       6.10 139.5
    1 10
             SU2 F9 1.00
                            0.00 0.00
                                                         7.96 259.71
11
                                                   0.08
11 1 11
             SU2 F10 1.00
                            1.02 726.2 3.38 232.2 3.36 4.20 235.96
   1 12
             EU2 F11 1.00
BU2 F12 1.00
                            0.00 0.00
                                       26.66 46.64
                                                   0.00 33.92 331.05
11 2 13
                            0.00 0.00
                                       10.63 89.49
                                                   0.00
                                                         14.07 230.18
            SU2 F13 1,00
   Z 14
                            0.00 0.00 13.67 74.11
                                                  0.00 19.11 229.25
11
            SU2 F14 1.00
11 2 15
                            0.00 0.00 14.10 72.45
                                                  0.00 16.79 216.93
    2 16
             SU2 F15 1.00
                                       8.00 111.8 0.00 10.22 315.70
9.42 98.25 0.00 11.67 372.35
11
                            0.00 0.00
             SU2 F15 1.00
11 2 17
                            0.98 758.2
11 2 18
            SU2 F17 1.00 0.00 0.00
                                       8.10 110.7 0.00 10.10 413.59
11 2 19
             SU2 F16 1.00 0.00 0.00 10.10 93.07 0.00 12.65 387.26
    2 20
             SG2 F19 1.00
2.1
                            0.00 0.00
                                       3.10 250.6
                                                   0.00
                                                         3,87 413,69
    2 21
                                       11.10 86.58 0.00 13.87 395.83
             802 F20 1-00
11
                            0.00 0.00
    2 22
             BU2 F21 1.00
                           0.00 0.00
                                       3.10 250.6 0.00
                                                         3.87 409.31
11
   2 23
             SU2 F22 1.00
                           0.00 0.00
                                       5.10 162.1 0.00
                                                         6.46 348.43
             9U2 F23
                     1.00
                            0.00 0.00
                                        9.75 95.61
                                                  0.00 12.27 372.63
             SU2 F24 1.00
    3 25
                            0.00 0.00
                                       3.27 239.1
11
                                                   0.00
                                                         4.08 394.93
   3 26
             SU2 F25 1.00
                            0.00 0.00
                                       8.10 110.7 0.00 10.10 411.32
   3 27
             SU2 F26 1.00
11
                            0.54 1345
                                       6.86 126.6 0.00
                                                         8.46 413.77
    3 28
             SU2 F27
                     1.00
                            0.64 1152
                                        7.96 112.2
                                                   0.00
                                                         9.83 410.31
11
   3 29
             SU2 F28 1.00
                           0.00 0.00
                                       4,91 167,5
                                                  0.00
                                                         6.12 411.37
11 3 30
             SU2 F29 1.00
                           5.30 160.9 17.10 63.08
                                                 9.27 20.45 412.79
             SU2 F30 1,00
11
   3 31
                           1.30 579.1
                                       7.10 123.1
                                                         8,63 424,77
                                                  1.02
11
    3 32
             SU2 F31
                     1.00
                            5.55 154.7
                                       12.85 77.57
                                                  11.34
                                                         15.10 431.17
11
   3 33
             SU2 F32 1.00
                           0.00 0.00
                                       2.10 357.5
                                                         2.62 414.34
                                                  0.00
11
   3 34
             SU2 F33 1.00
                          0.00 0.00
                                       9.15 100.5
                                                 0.00 11.40 424.25
                          0.00 0.00 6.10 139.5 0.00
11 3 35
             SU2 F34 1.00
                                                         7.61 416.10
11
   3 36
             SU2 F35 1,00
                            0.00 0.00
                                        9.94 94.20
                                                  0.00
                                                         12.41 406.14
11 6 37
             SUZ F36 1.00 0.00 0.00 6.48 132.7 0.00
                                                         8.06 431.03
```

25 0	ot 2	009 11	:35	A	LPHA/BETA	9 - 1	09		Page #2
Prot	cocol	#:11		8	mears H-	3 & C	-14	User :	EaglePicher / ES
						4-3	C-IH		
P# PI	D S#	SMPL_ID	TIME	CPMA A:25%	CPMB B:25%	DPM1	DPM2 tSIE FLAG		
11	6 38	SU2 F37	1.00	1.30 579.1	11.10 86.58	0.00	13.64 407.37		
11	6 39	SU2 F38	1.00	0.00 0.00	4.96 166.0	0.00	6.19 408.89		
11	6 40	SU2 F39	1.00	0.00 0.00	13.10 76.47	0.00	16.33 416.28		
11	5 41	SU2 F40	1.00	0.00 0.00	4.84 169.4	0.00	6.04 414.32		

```
25 Oct 2009
                                       ALPHA/BETA - 1.09
                   11:52
                                                                                                       Page #1
 Protocol #:24
                                       Smears H-3 & C-14
                                                                                    User : EaglePicher / ES
Time: 1.00
                             Nuclides: 3H-14C
Data Mode: Dual DPM
                                                  Quench Sets
                                                    Low Energy: 3H
Background Subtract: 1st Vial
                                                    High Energy: 140
            LL
                 UL
                       LCR
                             25%
                                     BKG
Region A: 0.0 - 12.0
                       0
                             0.0
                                    10.18
Region B: 12.0 - 156
                         0
                             0.0
                                    17.92
Region C: 0.0 - 0.0
                             0.0
                                    0.00
Quench Indicator: tSIE/AEC
  Ext Std Terminator: Count
FSS Smears in 20 ml Ultima Bold
Caincidence Time(ns): 18
Delay Before Burst(ns): Normal
Protocol Data Filename: C:\EP\PROT.DAT
Count Data Filename: C:\EP\SDATA24.DAT
                                                       H3 C-14
 P# PID S#
              SMPL ID TIME
                             CPMA A:29%
                                          CPMB B: 25%
                                                       DPM1
                                                              DPM2 tSIE FLAG
 24 7 1
                      10.00
                             10.18 19.83
                                         17.92 14.94
                                                                  420.71
    7 2
               SU2 W1 1.00
                             0.00 0.00
                                          0.00 0.00
                                                       0.00
                                                              0.00 401.82
               SU2 W2 1.00
 24
                                          0.00 0.00
                              0.36 1897
                                                      1.10
                                                             0.00 414.79
               SU2 W3
                       1,00
                              0.00 0.00
                                          0.00 0.00
                                                      0.00
                                                             0.00 458.37
               SU2 ₩4
                      1,00
                              1,02 395,5
                                          0.00 0.00
                                                      5,64
                                                             0.00 413,57
 2
               BU2 W5 1.00
                              0.9B 714.5
                                          0.00 0.00
                                                             0.00 428,94
                                                     2,92
 24
               SU2 W6 1.00
                              0.00 0.00
                                          0.56 1599
                                                      0.00
                                                             0.70 418.37
 25
               SU2 W7
                       1.00
                              2.82 265.1
                                          0.00 0.00
                                                      8.39
                                                             0.00 432.30
 24
               SU2 W8 1.00
                              0.00 0.00
                                          0.00 0.00
                                                      0.00
                                                             0.00 413.75
    7 10
               502 49 1,00
                              0.00 0.00
                                          0.00 0.00
                                                             0.00 433.27
                                                      0.00
 24
    7 12
              502 010 1.00
                              0.82 841.1
                                          0.00 0.00
                                                     2,54
                                                             0.00 415,57
     7 12
              SU2 W11
                      1.00
                              1.33 532.9
                                          0.00 0.00
                                                      3,99
                                                             0.00 425.63
    5 13
                                          3,08 310,4
 74
              SU2 W12 1,00
                             0.00 0.00
                                                      0.00
                                                             3.83 418.7:
 74
    8 14
              5U2 W13 E.00
                             4.16 138.6
                                          6.89 149.6
                                                      10.05
                                                             7,91 410,13
    8 15
              SU2 W14 1.00
                              0.15 4625
                                          1,75 528.2
                                                      0,00
                                                             2.16 417.27
 14
    9 16
              SU2 W15 1.00
                              0.00 0.00
                                          4.85 204.2
                                                      0.00
                                                             6.05 412.72
 24
    8 17
              SU2 W16 1.00
                             1.82 395.5
                                          0.08 11759
                                                      5.43
                                                            0.00 427.48
 =4
    8 18
              5DZ #17 1.00
                             0.00 0.00
                                          0.08 11759
                                                     0.00
                                                             0.09 420.15
24
    8 19
              SU2 W18 1.00
                             0.00 0.00
                                          0,00 0,00
                                                             0.00 416.45
                                                      0.00
 24
    8 20
              SU2 W19
                       1.00
                              1.82 395.5
                                          0.00 0.00
                                                      5.57
                                                             0.00 411.26
24
    8 21
              SU2 W20 1.00
                             0.00 0.00
                                          5.08 196.Z
                                                     0.00
                                                             6.33 417.72
24
    8 22
              SU2 W21 1.00
                             0.00 0.00
                                          0.00 0.00
                                                     0.00
                                                             0.00 414.92
24
    8 23
              SU2 W22
                       1.00
                             0.00 0.00
                                          0.00 0.00
                                                      0.00
                                                             0.00 413.01
24
    8 24
              SU2 W23 1.00
                             4.04 193.4
                                          3,86 251,4
                                                     10.90
                                                             4.15 412.28
24
    9 25
              SU2 W24 1.00
                             0.00 0.00
                                          1.64 563.5
                                                             2.04 422.50
                                                     0.00
    9 26
              SU2 W25 1.00
                             0.00 0.00
                                          0.96 952.1
                                                     0.00
                                                             1.19 419.67
24
    9 27
              SU2 W26
                       1.00
                              0.00 0.00
                                          0.00 0.00
                                                      0.00
                                                             0.00 403.43
              SU2 W27
24
    9 28
                      1.00
                             2.82 265.1
                                          4.08 239.4
                                                     6.67
                                                             4.62 439.72
24
   9 29
              SU2 W28 1.00
                             0.00 0.00
                                          0.00 0.00
                                                     0.00
                                                            0.00 448,74
    9 30
34
              SU2 W29
                     1.00
                             5.41 150.6
                                         0.00 0.00
                                                     15,92
                                                            0.00 438.91
24
    9 31
              SU2 #30
                      1.00
                             2.52 294.0
                                          1.38 665.3
                                                     6.91
                                                             1.31 434,35
34
    9 32
              SU2 W31 1.00
                             0.00 0.00
                                         0.00 0.00
                                                     0.00
                                                             0.00 434.90
24 9 33
              SU2 W32 1.00
                             0.00 0.00
                                         0.00 0.00
                                                     0.00
                                                             0.00 422.45
    9 34
              SU2 W33 1.00
                             9.09 99.12 10.81 102.2
                                                     23,52 11.98 414.57
24
    9 35
              SU2 W34
                       1.00
                             3.82 202.7
                                         10.08 108.3
                                                     7.33
                                                           11.92 430.61
   9 36
              8U2 W35 1.00
                             2.34 314.8
                                         0.00 0.00
                                                     7.28
                                                            0.00 410.39
24 10 37
              SU2 W36 1.00
                            1.57 454.8 0.00 0.00
                                                    4.64 0.00 436.7e
```

21	5 0	ct 2	009 13	:06		A	PHA	/BET	A - 1	.09			 Page #	2	
Pi	-ot	ocol	#:24			S	mear	s H-	3 & C			User	EaglePicher	/ E	ES
P	PID	S#	SMPL_ID	TIME	CPMA	A:25%	CPMB	B:25%		DPM2					
2	1 10	38	SU2 W37	1.00	0.00	0.00	0.00	0.00	0.00	0.00	413.94				
3	1 10	39	SU2 W38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	426.82				
2	10	40	SU2 W39	1.00	0.00	0.00	0.00	0.00	0.00	0.00	423.5E				
2	10	41	SU2 W40	1.00	0.00	0.00	0.00	0.00	0.00	0.00	438.65				

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28 Oct 2009 10:41
                                   ALPHA/BETA - 1.09
                                                                                              Page #1
Protocol #:24
                                   Smears H-3 & C-14
                                                                            User : EaglePicher / ES
Time: 1,00
Data Mode: Dual DPM
                       Nuclides: 3H-14C
                                             Quench Sets
                                               Low Energy: JH
Background Subtract: 1st Vial
                                               High Energy: 140
          LL UL
                    LCR
                          28%
                                  BKG
Region A: 0.0 - 12.0
                    0
                          0.0
                                10.43
Region D: 12.0 - 156
Region C: 0.0 - 0.0
                      0
                          0.0
                                15.77
                         0.0
                                 0.00
                      0
Quench Indicator: tSIE/AEC
 Ext Std Terminator: Count
FSS Smears in 20 ml Ultima Gold
Coincidence Time(ns): 18
Delay Before Burst(ns): Normal
Protocol Data Filename: C:\EP\FROT.DAT
Count Data Filenama: C:\EP\SDATA24.001
                                                                                    C-14
                                                                         4-3
               SMPL_ID TIME CPMAA:25% CPMBB:25%
                                                                        DPM1
 PAPID SH
                                                                                  DPM2 tSIE FLAG
                           10.0
                                     10-4 19.6 15.8 15.9
 24
                                                                                       428
          28U 2 Ceiling-1
                                                                           14.10
                                                                                                456
                                                             5-1 160
                                                                                        6.63
                                                                            0.00
 24
          3SU 2 Geiling-2
                                   1.1)
                                           0.0 0.0
                                                           11.1 96.2
                                                                                        3.92
          45H 2 Ceiling-3
                                           0.6 1222
                                                            Ju 11 11
                                                                                                457
      =3
                                  1.0
                                                                            0.36
                                                            4.2 220
 24
     8 5GU 2 Celling-4
                                   Lati
                                         0.0 0.0
                                                                           0.00
                                                                                        5.25
                                                                                                460
                                  1.0 0.0 0.0
1.0 4.6 175
                                                                  769
220
                                                            1. . 2
                                                                            0.00
                                                                                       1.53
      8 ASH 2 Celling-3
                                                                                                454
         75U 2 Geiling-A
88U 2 Geiling-7
 24
     83
                                                            4,2
                                                                            11.46
                                                                                       4.54
                                                                                                45.76
                                                            0.2 3615
                                            0.6 1222
                                   1.0
                                                                            1.54
                                                                                       0.20
                                                                                                455
                                                           10.5 99.7
 24
                                                   108
     8 99U 2 Ceiling-8
                                   1.0
                                            8.2
                                                                            19.32
                                                                                      11.88
      8
         JOSU 2 Ceiling-9
                                                            0.2 5574
                                   1.0
                                                                            0.00
                                                                                       0.19
                                                                                                452
                                   7.2 137
24 8 115U 2 Ceiling-10 1.0
                                                   8.98 445
                         0.0 0.0
                                            0.00
14 8 125U Z Seiling-11 1.0
                          4.8 169
                                   11.0 98.5
                                             7.31
                                                   12.96 457
                         2.7 279
24 9 1380 2 Celling-12 1.0
                                    7,1 139
                                             4,97
                                                   8,40 454
24 9 145U 7 Ceiling-13
                    1.0
                          1.6 661
                                    3.2 281
                                             3.24
                                                    3.77 454
24 9 155U 2 Ceiling-14 1.0
                          2.9 255
                                    2.9 306
                                             7,04
                                                   3,21 455
24 9 1650 7 Ceiling-15 1.0
                          7.6 115
                                    0.0 0.0
                                            21.81
                                                    0.00 453
24 9 17SU 2 Ceiling-16 1.0
                          0.0 0.0
                                    0.0 0.0
                                             0.00
                                                    0.00 450
14 9 185U 7 Ceiling-17
                    1.0
                          0.0 0.0
                                    7.2 137
                                             0.00
                                                    8.98 456
                                    2.2 398
24 9 198U 2 Ceiling-18 1.0
                          4,6 175
                                            12.27
                                                    2,06 454
                                    1.2 726
14 9 2050 2 Seiling-19 1.0
                          4.8 174
                                            12.88
                                                   0.75 450
24 9 218U 2 Ceiling-20 1.0
                          0.0 0.0
                                   0.1 1881
                                             0.00
                                                   0.09 456
24 9 225U 2 Ceiling-21
                    1,0
                          7.6 115
                                   6.2 156
                                            19,41
                                                   6.55 451
24 9 23SU 2 Ceiling-22
                   1.0
                          2.6 285
                                   12.2 89.3
                                             2.84
                                                   14.69 452
24 9 24SU 2 Ceiling-23 1,0
                          0.9 920
                                   6.0 160
                                            0.00
                                                   7.39 457
24 10 259U 2 Ceiling-24
                    1.0
                          0.0 0.0
                                    0.0 0.6
                                             0.00
                                                    0.00 450
14 10 265U 2 Seiling-25 1.0
                                    4,9 192
                                                    6.09 456
                          0,0 0,0
                                             0.00
24 10 278U 2 Ceiling-26 1.0
                                   1.2 700
                          0.6 1222
                                             1.14
                                                   1.44 458
74 10 2850 2 Deiling-27 1.0
                                   0.2 3615
                                                   0.29 455
                                             0.00
                          0,0 0,0
24 10 298U Z Cailing-28
                    1.0
                          1.6 461
                                    2.2 396
                                             3.67
                                                   2,53 448
14 10 305U 2 Celling-29
                          3,7 212
                                   0.0 0.0
                                                   0.00 453
                    1-0
                                            10.58
24 10 3180 2 Ceiling-30 1.0
                          0.0 0.0
                                                   0.29 45
                                    0.2 3615
                                            0.00
24 16 3260 2 Ceiling-31 1.0
                          0.0 0.0
                                   0.0 0.0
                                             0.00
                                                   0.00 450
24 10 3380 2 Celling-32
                    1.0
                          0.0 0.0
                                    3.1 287
                                             0.00
                                                   J.89 45_
                                    3,3 379
14 10 345U Z Ceiling-53
                    1.0
                          0.0 0.0
                                                    2,91 452
                                            0.00
24 10 35SU 2 Ceilino-34 1.0
                          1,7 428
                                   9,1 117
                                            1,37
                                                   11.01 455
04 10 3650 3 Cailing-35 1.0
                         6.6 120
                                   7.2 137 18.11
                                                   7,95 452
24 1 375U 2 Celling-36 1.0
                         9.6 95.9
                                   12.2 B8.9
                                            22.74
                                                   13,69
    I SEMPLE IN ITTHE CAMA I CAMB
                                           DAMI DAMA TSIE
                                       22 H-3/ 17-14
                           22
```

28 Oct 2009 11:55	ALPHA/BETA - 1.09	Page #2
Protocol #:24	Smears H-3 & C-14	User : EaglePicher / ES
P#PID S# SMPL_ID TIME 24 1 388U 2 Ceilino-37 1.0 0.0 0.0	CPMAA: 28%	DPM1 DPM2 tSIE FLAG

14 | 395U 2 Deiling-38 | 1.0 | 0.0 | 0.0 | 5.2 | 182 | 0.00 | 6.49 | 455 | 24 | 1 405U 2 Deiling-39 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 455 | 0.00 | 12.25 | 454 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 4.3.3 SU003-Exterior Walls

This was a Class 3 survey unit.

Summary results are provided in Table 4-4 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

**Table 4-4: SU003 Summary Results** 

Summary Survey Unit 003 Exterior Walls, Class 3	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums* (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm <sup>2</sup> )
Number	40	2	40	40
Average	2,343	4,838	7	2
Standard Deviation	665	N/A	7	4
Maximum	3,310	6,366	28	17

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



### FSS Survey Package Worksheet for EaglePicher SU003

Package Identification No.: SU03F/SU03S	Prepared by: Paul C. Ely
Location: Building Exterior Walls	Date Prepared: 9/30/2009
Area Classification: Class 3	Signature: Par Ely

#### Area Description

The survey area includes the Exterior building walls.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

#### General Survey Instructions

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $ε_i$ , 2π instrument efficiency from calibration papers. If a 4π efficiency is reported, calculate the 2π efficiency as follows using a 5% beta Back Scatter factor (BS).  $ε_i = (2 * ε_{4π}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - ε<sub>t</sub>, the total beta efficiency = ε<sub>i</sub> \* ε<sub>s</sub>
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 25% scan of lower walls (6-feet and below) for beta contamination and 10% scan of upper walls for beta contamination.
- Perform direct beta surface activity measurements at each measurement location. Mark and the survey location on
  the walls with a felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the
  survey unit. Random survey locations were generated for this class 3 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm<sup>2</sup> in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Survey Package Worksheet SU03F/SU03S (cont'd)

Source check instrumentation to C. The static MDC for total beta activi 3,000 dpm/100 cm². Perform a minimum of three one-mi plastic shield on the survey surface. Log scan measurements or record m cpm on a Grid Scan Record.  Location Codes  Location Codes  Genera	instrumental C for total b cm². imum of thu on the surve, surements oo Scan Recon Scan L6	n to C-14 fc a activity m some-minute surface. ecord maxim General Gescription	or beta m casurem if field ba num scal	seta measurements.  The attached survey map. If a strached map provides and scan measurement results in  Survey Performance (Initial and date as each item is completed)  Seta Survey Direct Survey Direct Survey Alpha Survey Scan Tech Alpha Survey Tech A	ents. I be less ds using	than the esults in	•	Randoml the attack	y genera	ted meas	urement a	nd sampling	Randomly generated measurement and sampling locations are indicated on the attached survey map. If any location is inaccessible, offset the	indicated or
			Survey Beta	y Perfora			•	measurement location on the map. The attached map pr	nent locs on the map shed map	ap.	he nearest	ution is inac usable loca ment and sa	measurement location to the nearest usable location and mark the survey location on the map.  The attached map provides measurement and sampling locations.	the he survey is.
					nance (	Initial ar	nd date :	as each it	tem is co	mpleted	0			
	FF TF			_	-								Smoor	
				1	Direct Beta	Survey Tech	Direct Alpha	Survey Tech	Alpha Scan	Survey Tech	Direct Gamma	Survey Tech	Gross (Liq. Scint.)	Survey Tech
					EagleF	icher SU	7003 CI	EaglePicher SU003 Class 3 Area	ca.					
Package Surface ID or Structure	Material			Initial & Date	09@s	Initial & Date	@ec	Initial & Date		Initial &	@100 cm	Initial & Date	β	Initial & Date
SU03F W01	B0021	Walls	N/A	N/A	40	2 3	N/A	N/A	N/A	N/A	N/A	N/A	40	4.5
SU03S W01	B0021	Lower Wall	25%	62.98-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				-										

Location Codes			Sur	Survey Performance (Initial and date as each item is completed)	rmance (	Initial a	nd date	Performance (Initial and date as each item is c	tem is co	ompleted				
1.2   1.6   Description   Stan   Tech   Beta   Tech   Aphta   Tech   Stan   Tech   Gamma   Tec	Location Codes		$\vdash$	-	i		-		_				Smear	
Survey  Veyor(s) Signatures:  Packa	12	Description	_	$\overline{}$	Beta	Survey	_	Survey		Survey	Direct	Survey	Gross (Liq. Scint.)	Survey
Survey  Veyor(s) Signatures:  Packa  Packa  Packa  Packa  Rage Review by and Date (Signature):  Packa														
Survey Survey Survey Signatures: 7, 6, 27/0 9  Rage Review by and Date (Signature): 10, 27/0 9			_											
Survey Signatures:  Packa  Pac			1											
Survey Signatures:  Packa  Pac			_											
Survey  Veyor(s) Signatures:  Packa  Packa  Packa  Packa  Packa  Packa  Rage Review by and Date (Signature):  Packa  Packa														
Survey Signatures:  Packa  Pac														
Survey  Veyor(s) Signatures:  Packa														
veyor(s) Signatures:  Packa						Survey	Соште	nts						
Packa; e Package Completed: 10/27/09 kage Review by and Date (Signature):														
Packa, veyor(s) Signatures:  Packa, 10/27/09  kage Review by and Date (Signature):														
Packa Package Completed: 10/27/09 kage Review by and Date (Signature):														
veyor(s) Signatures:  Package Completed: 10/27/09  kage Review by and Date (Signature): 10/27/09						Packag	ge Revier	W						
kage Review by and Date (Signature): Man C S.C.	Surveyor(s) Signatures:	7	ha		leg.	00	M	En	X					
kage Review by and Date (Signature):	Date Package Completed	101	27/0	6					0					
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			1											

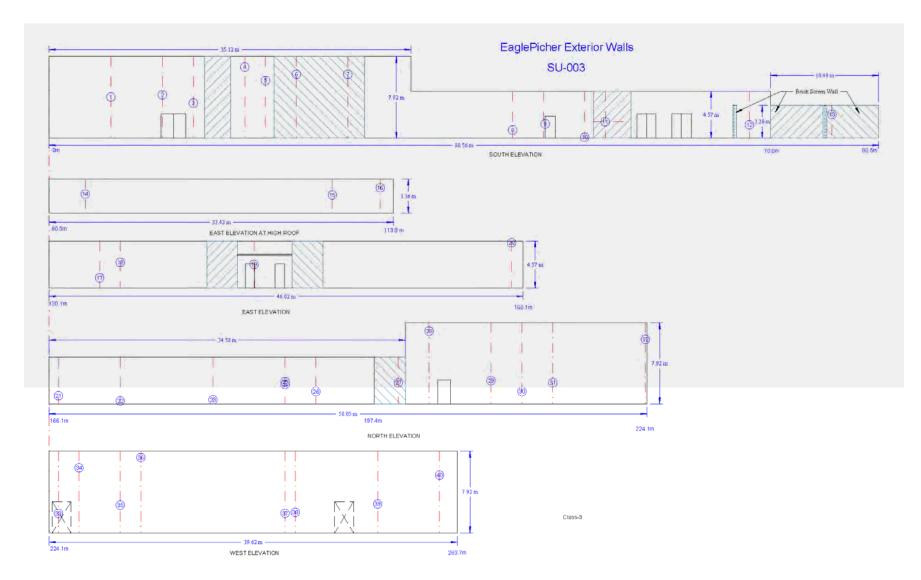
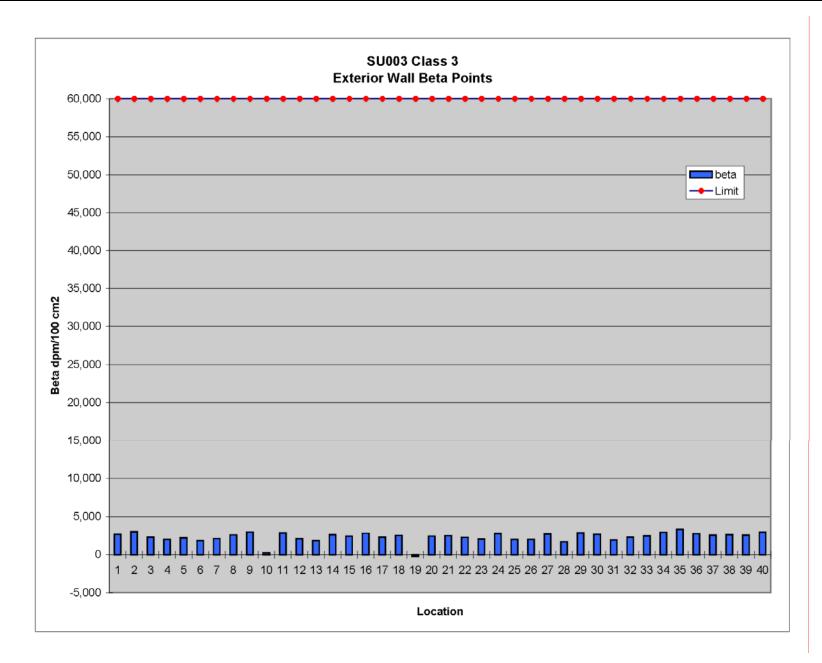


Figure 4-3 SU003 Survey Map

EaglePicher FSS Data Sheet Survey Unit 003 Exterior Walls

Detector Type	Detector SN	Detector (cm <sup>2</sup> )	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	091028	126	9/30/10	2350-1	117566	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

			В	eta	HK	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	oc.*	(dpm/100cm <sup>2</sup> )				
1	W	Walls	2,695	60,000	10.6	6,000	0.0
2	W	Walls	3,003	60,000	2.6	6,000	0.0
3	W	Walls	2,324	60,000	7.6	6,000	0.0
4	W	Walls	1,984	60,000	0.0	6,000	0.0
5	W	Walls	2,207	60,000	0.0	6,000	0.4
6	W	Walls	1,846	60,000	7.7	6,000	0.0
7	W	Walls	2,122	60,000	3.4	6,000	15.1
8	W	Walls	2,600	60,000	0.0	6,000	5.9
9	W	Walls	2,971	60,000	10.6	6,000	0.0
10	W	Walls	233	60,000	0.0	6,000	5.6
11	W	Walls	2,833	60,000	19.7	6,000	0.0
12	W	Walls	2,090	60,000	16.4	6,000	0.0
13	W	Walls	1,825	60,000	2.6	6,000	0.0
14	W	Walls	2,642	60,000	15.6	6,000	1.2
15	W	Walls	2,409	60,000	28.1	6,000	0.0
16	W	Walls	2,812	60,000	0.0	6,000	11.7
17	W	Walls	2,302	60,000	0.0	6,000	16.9
18	W	Walls	2,557	60,000	8.2	6,000	0.0
19	W	Walls	-244	60,000	7.2	6,000	0.0
20	W	Walls	2,451	60,000	0.0	6,000	1.8
21	W	Walls	2,504	60,000	11.2	6,000	0.0
22	W	Walls	2,281	60,000	1.6	6,000	0.8
23	W	Walls	2,048	60,000	0.0	6,000	0.9
24	W	Walls	2,801	60,000	0.1	6,000	0.0
25	W	Walls	1,984	60,000	10.0	6,000	1.5
26	W	Walls	2,005	60,000	11.1	6,000	0.0
27	W	Walls	2,727	60,000	0.0	6,000	0.0
28	W	Walls	1,708	60,000	0.0	6,000	1.8
29	W	Walls	2,844	60,000	0.0	6,000	0.0
30	W	Walls	2,695	60,000	16.4	6,000	0.0
31	W	Walls	1,931	60,000	11.6	6,000	5.1
32	W	Walls	2,313	60,000	5.9	6,000	0.0
33	W	Walls	2,462	60,000	13.7	6,000	0.0
34	W	Walls	2,918	60,000	10.7	6,000	0.0
35	W	Walls	3,310	60,000	0.0	6,000	2.1
36	W	Walls	2,769	60,000	13.5	6,000	0.0
37	W	Walls	2,578	60,000	11.1	6,000	0.0
38	W	Walls	2,642	60,000	13.4	6,000	0.0
39	W	Walls	2,589	60,000	0.0	6,000	0.0
40	W	Walls	2,960	60,000	0.0	6,000	0.0
Average	W	Walls	2,343		6.8		1.8
Standard Deviation	W	Walls	665		7.0		4.0
Maximum	W	Walls	3,310		28.1		16.9







M2350-1 Download BETA Report

Survey Reason : Final Status		
User ID : RLS2098	Technician Name : Lee Severtso	ni)
Instrument Model : 2350-1	Instrument S/N : 117566	Instrument Cal. Due : 9/28/2010
Detector Model 43-68b	Detector S/N : 091028	Detector Cal. Due 9/28/2010
Measurement Type : BETA	Detector Type : 02200 : 126 cm2	Gas Proportional Detector
Detector Area : 126	Efficiency: 0.0748	Survey Date : 10/26/2009
Minimum Net DPM Observed: -244	Mean Net DPM: 3963	
Maximum Net DPM Observed: 43088	STDEV Observed: 8265	# of Samples Taken: 47

Lee Severtson

Print Name

Signature

Signature

Date

10-26-69

Date

10/26/09

Print Name

Signature

Date

nents:					
NO	scan	readings	found	7 600	cpm
	The state of the s				

Sign-Off Paul Ey Paul Eg 10/27/09
Print Name Y Paul Eg 10/27/09
Page 1 of 3

# Duratek Beta Survey Report

Download File Name: 00000034

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
ZZZZZ	ZZZZZ	0	1,773.0	600	PRBBK	22222	77777	5	0	1,881
ZZZZZ	ZZZZZ	1	3,970.0	60	PRBBK	ZZZZZ	22222	6	0	42,123
77777	77777	2	2,093.0	600	PRBBK	ZZZZZ	ZZZZZ	7	0	2,221
ZZZZZ	ZZZZZ	3	4,061.0	60	PRSC1	ZZZZZ	27777	1	0	43,088
SU03F	W01	4	326.0	60	FLDBK	B0021	ZZZZZ	1	259	711
SUGAF	W01	5	513.0	60	FLDCT	B0021	27777	1	259	2,695
SU03F	W01	5	542.0	60	FLDCT	B0021	22272	2	259	3,003
SU03F	W01	7	478.0	60	FLOCT	B0021	22222	3	259	2,324
SU03F	W01	8	446.0	60	FLDCT	B0021	22272	4	259	1,984
SU03F	W01	9	467.0	60	FLDCT	B0021	27772	5	259	2,207
SU03F	WO1	10	433.0	60	FLDCT	B0021	22222	8	259	1.846
SU03F	W01	11	459.0	60	FLOCT	B0021	ZZZZZ	7	259	2,122
SU03F	WOT	12	504.0	60	FLDCT	B0021	27777	8	259	2,600
SU03F	W01	13	539.0	60	FLDCT	B0021	27272	9	259	2,971
SUOSF	W01	14	281.0	60	FLDCT	B0021	22727	10	259	233
SU03F	WOT	15	526.0	60	FLDCT	80021	27777	11	259	2,833
SUOSF	W01	16	456.0	60	FLDCT	80021	27272	12	259	2,090
SUDAF	Wo1	17	431.0	60	FLDCT	B0021	77777	13	259	1.825
SU03F	W01	18	476.0	60	FLDCT	B0021	ZZZZZ	17	259	2,302
SU03F	WD1	19	500.0	60	FLDCT	B0021	77777	16	259	2,557
SU03F	Wot	20	236.0	60	FLDCT	B0021	77777	19	259	-244
SU03F	W01	21	490.0	60	FLDCT	B0021	22222	20	259	2,451
SU03F	W01	22	495.0	60	FLOCT	B0021	22222	21	259	2,504
SU03F	Wat	23	474.0	60	FLDCT	80021	ZZZZZ	22	259	2,281
SU03F	W01	24	367.0	60	FLDBK	80021	27272	22	259	1,148
SUOSE	W01	25	452.0	60	FLDCT	B0021	ZZZZZ	23	259	2,048
SUOSF	VV01	26	523.0	60	FLDCT	B0021	27222	24	259	2,801
SUOSE	W01	27	446.0	60	FLOCT	B0921	22772	25	259	1,984
SU03F	W01	28	448.0	60	FLDCT	B0021	27777	26	259	2,005
SUOSF	W01	29	516.0	60	FLDCT	B0021	22222	27	259	2,727
SU03F	W01	30	420.0	60	FLDCT	80021	27222	28	259	1,708
SUOSE	Wot	31	527 0	60	FLOCT	B0021	ZZZZZ	29	259	2,844
SU03F	W01	32	513.0	60	FLDCT	B0021	ZZZZZ	30	259	2,695
SUOSE	W01	33	441.0	60	FLDCT	B0021	22272	31	259	1:931
SU03F	W01	34	477.0	50	FLDCT	B0021	22222	32	259	2,313
SUOSF	W01	35	491.0	60	FLDCT	B0021	ZZZZZ	33	259	2,462
SU03F	W01	36	534.0	60	FLDCT	B0021	ZZZZZ	34	259	2,918
SU03F	W01	37	571.0	60	FLDCT	B0021	ZZZZZ	35	259	3,310
SU03F	W01	38	520.0	60	FLDCT	B0021	ZZZZZ	36	259	2,769

 Beta Flag
 45000 -\_\_\_\_

 Beta Max Flag
 60000 \_\_\_\_\_

Tuesday, October 27, 2009

Page Z of 3

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU03F	W01	39	502.0	60	FLDCT	B0021	ZZZZZ	37	259	2,578
SU03F	W01	40	508.0	60	FLDCT	B0021	ZZZZZ	38	259	2,642
SU03F	W01	41	503.0	60	FLDCT	B0021	ZZZZZ	39	259	2,589
SU03F	W01	42	538.0	60	FLDCT	B0021	ZZZZZ	40	259	2,960
SU03F	W01	43	508.0	60	FLDCT	B0021	22272	14	259	2,642
SU03F	W01	44	486.0	60	FLDCT	B0021	27772	15	259	2,409
SU03F	W01	45	524.0	60	FLDCT	B0021	<b>ZZZZZ</b>	16	259	2,812
SU03F	W01	46	385.0	60	FLDBK	B0021	ZZZZZ	16	259	1,337

Beta Flag 45000 - \_\_\_\_\_\_
Beta Max Flag 60000 \_\_\_\_\_\_

Tuesday, October 27, 2009 Page 3 of 3

		2009 01 #:	16:	09		L <u>PHA/B</u> mears				54003	e e Ess		de #1 her / E
			do de		50	FILL COLF TO	11-5 0	W-14		USE	r a cal	J. C. T. C.	ner / E
Time:	1.0	00											
Data M	lode:	Dual DPM		N	uclides: 3H-	14C	Quench Se	ets nergv: 3H					
Backgr	ound	Subtract	: 1st Vi	al				Energy: 140					
		LL	UL I	LCR	25% BK6								
Region	A:	0.0 -			0.0 9.30								
		12.0 -			0.0 18.30								
Region		0.0 -			0.0								
		cator: t											
			or: Count										
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			ns): Norm	na!									
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			: C:\EP\S										
DOM:		Latendad	0 0 10 10	2411.112.2						H-3	C-14		
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		5#	SMPL	1.10	TIME 10.0	CPMAA 9.3		CPMBB		DEM1	DPM2	422	FLAD E
	E		wall.	徒上	1.0	3.7	202	0.0		10.63	0.00	455	
	1.		Mall		1.0	0.9		0.0		2.64	0.00	455	
	1		Wall			2.7	266	0.0	0-0	7.62	0.00		
1.1			Wall		1-0		0.0	0.0	0.0		0.00	46	
1			Wall		1.0	0.0	0.0	0.3 :		0.00	0.40	454	
11			Wall		1.0	2.7	266	0,0		7.72	0.00		
	1		Wall		1.0	2.9	250	12.5		3.43	15.07	453	
	1		Wall		1.0	0.0	0.0	4.7	212	0.00	5.85	4.3-	
1.1			Wall		1.0	3.7	202	0.0		10.63	0.00	455	
1.1			Wall		1.0	0.0			220	0.00	5.63		
11			Wall		1.0	6.7	123	0.0	0.0	19.66	0.00		
11	2	13EX	Wall	#12	1.0	5.7	140	0.0	0.0	16,36	0.00	456	
1.1	2	14EX	Wall	#13	1.0	0.9	744	0.0		2.57	0.00		
11	2	15EX	Wall	#14	1.0	5.7	140	1.7	549	15.63	1.23	459	
11	2	18EX	Wall	#15	1.0	9.7	92.1	0.0	0.0	28.12	0.00	449	
11	2	17EX	Wall	#16	1.0	0.8	793	9.6	114	0.00	11.74	455	
11	200	<b>LBEX</b>	Wall	#17	1.0	0.0	0.0	13.6	85.3	0.00	16.92	452	
11			Wall		1.0	2.4	254	0.0	0.0	8.19	0.00	455	
- 1	2	20EX	Wall	非主导	1.0	2 - 2	Section 2	0.2	4146	7.23	0.00	379	
11	2	ZIEX	Wall	#20	1.0	0.0	0.0	1 . 0.	640	0.00	1.77	46:	
1	2	ZZEX	Wall	#21	1.0	3.9	1.92	0.0	0.0	11.19	0.00	458	
11	2	23EX	Wall	#22	1,0	3.7	1011	0.7	1223	1.60	0.83	440	
1	72	24EX	Wall	#23	1.0	0.0	0.0	0.7	1302	0.00	0.87	453	
11			Wall		1.0	0.0	米米米米	0.0	0.0	0.09	0.00	456	
1 1			Wall		1.0	3.7	202	1 . 7	549	9,98	1.53	454	
11	3	27EX	Wall	#26	1.0	3.9	194	0.0	0.0	11.10	0.00	455	
1			Wall			0.0			0.0	0.00	0.00		
11			Wall		1-0		0.0	1.5	627	0.00	1.84		
11			Wall		1.0	0.0		0.0	0.0	0.00	0.400		
	3		Wall		1.0	5.6	145	0.0	0.0	16.35	0.00	244	
1.1		35 3 Fe X	Wall		1.0	4.7		4.7		11.62	5.10		
1.1					4 /	2.1	341	0.0	0.0	5.90	0.00	457	
11	3	SSEX	Wall		1.0								
1.1 1.1 1.1	3	33EX 34EX	Wall	#35	1.0	4.8	161		1559	13.69	0.00		
11 11 11 11	3	33EX 34EX		#35			161	0.6		13.69 10.65		45.L	
1.1 1.1 1.1	2	33EX 34EX 35EX	Wall	#33 #34	1.0	4.8 3.7 0.0	161 202	0.6 0.0 1.7	1559	13.69	0.00	45.1 455	

Frot	oc	01 非::	1. 1.		C	mears H	-3 &	C-14		User #-3	Eag:	lePicher /	ES
P#P	TD	5#	SMPL	TD	TIME	CPMAA:	25%	CPMBB:	28%	DPM1		SIE FLAG	
11	7	38EX	Wall	#37	1.0	3.9	191	0.5	1934	11.05	0,00	459	-
11	T	SPEX	Wall	#38	1.0	4.7	164	0.0	0.0	13,43	0.00	459	
11	7	40EX	Wall	#39	2 . 0	0.0	0.0	0.0	0.0	0.00	0.00	4.5	
1.1	7	41EX	Wall	#40	1.0	0.0	0.0	0.0	0.0	0.00	0,00	448	

# 4.3.4 SU004-High Roof

Roofing material in the northwest corner of the roof was removed as contaminated material and shipped to a radwaste disposal site. In addition the vent stacks (Figure 4-4) that served the lab area and extended through the roof were removed as contaminated material and shipped to a radwaste disposal site. The roof was then surveyed as a Class 2 survey area.

Summary results are provided in Table 4-5 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

Summary Survey Unit 004 High Roof, Class 1	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums* (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm <sup>2</sup> )
Number	28	2	28	28
Average	3,105	5,758	9	4
Standard Deviation	1,715	N/A	10	6
Maximum	7,200	7,200	46	22

**Table 4-5: SU004 Summary Results** 

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



Figure 4-4 SU004 Vent Stacks on High Roof



#### FSS Survey Package Worksheet for EaglePicher SU004

Package Identification No.: SU04F/SU04S	Prepared by: Paul C. Ely
Location: Building High Roof	Date Prepared: 9/30/2009
Area Classification: Class 2	Signature: Faul Ely

#### **Area Description**

The survey area includes the building high roof.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

#### **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - ε<sub>i</sub>, 2π instrument efficiency from calibration papers. If a 4π efficiency is reported, calculate the 2π efficiency as follows using a 5% beta Back Scatter factor (BS). ε<sub>i</sub> = (2 \* ε<sub>4π</sub>) \ (1 + BS)
  - $\epsilon_s$ , the beta surface efficiency is 25%.
  - ε<sub>t</sub>, the total beta efficiency = ε<sub>i</sub> \* ε<sub>s</sub>
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 25% scan of roof for beta contamination.
- Perform direct beta surface activity measurements at each measurement location. Mark the survey locations with a
  felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the survey unit.
   Systematic survey locations were generated for this class 2 survey unit.
- 4. Collect a removable surface activity sample (smear) over an area of 100 cm² in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Page 1 of 3

Survey Package Worksheet SU04F/SU04S (cont'd)

								Special man ucuons	THISTIT	chous						
	Source check instrumentation to C-14 for beta measurements. The static MDC for total beta activity measurements shall be less than 3,000 dpm/100 cm <sup>2</sup> .  Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in cpm on a Grid Scan Record.	c instrum DC for to 00 cm², mimum o I on the st asuremen d Scan R	entation of three or its or it	on to C-14 1 ta activity n e one-minul surface. record maxi	or beti	to C-14 for beta measurements. activity measurements shall be ne-minute field backgrounds us rface. ord maximum scan measuremen	nents. all be le nds usii rement	ss than ng the results in	• •	Measure rectangu location coordina The atta	oment and to the nest to the state to the	Measurement and sampling locat rectangular pattern. If any locatic location to the nearest usable loc coordinates for the location used. The attached map provides roof n	g location location ble locatic n used. s roof mee	s are based is inaccessit and docur and docur asurement ar	Measurement and sampling locations are based on a random-start rectangular pattern. If any location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.  The attached map provides roof measurement and sampling locations.	tart neasurement y cations.
					Sur	Survey Performance (Initial and date as each item is completed)	mance	(Initial a	and dat	e as each	item is c	ompletec	(1)			
	Location Codes	odes													Curron	
	1.1 1.2	97		General Description	Beta Scan	Survey Tech	Direct Beta	Survey Tech	Direct Alpha	Survey Tech	Alpha	Survey Tech	Direct Gamma	Survey	Gross (Liq. Scint.)	Survey Tech
							Eagle	EaglePicher SU004 Class 2 Area	U004	lass 2 Ar	ea.					
Pa	Package Surface ID or Structure	c Material Code	rial le			Initial & Date	@60 sec	Initial & Date	@60 sec	Initial & Date		Initial & Date	@100 cm	Initial & Date	В	Initial & Date
St	SU04F R0001	B0012	12	Roof	N/A	Whee	28	50-H2-01	N/A	N/A	N/A	N/A	N/A	N/A	28	00%.
S	SU04S R0001	B0012	12	Roof	25%	10000	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
												П				
							31									
	-		+													
			+													
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Location Codes				Surv	Survey Performance (Initial and date as each item is completed)	mance (	Performance (Initial and date as each item is c	nd date	as each i	tem is co	ompleted				
Survey Comments  Package Review  Package Revie	Location Codes	S	l case and	9				-			t			Smear	
Survey Comments  Survey Comments  Package Review  Package Completed: 1/2/04  Rege Review by and Date (Signature): Mall Comments  Reger Review by and Date (Signature): Mall Comments	-	P7	Description	Scan	Tech	Beta	Tech	Alpha	Tech	Scan	Tech	Gamma	Survey	Gross (Liq. Scint.)	Survey
Survey Comments  Survey Comments  Package Review  Package Completed: 1/2/0  Rackage Completed: 1/2/0  Rackage Completed: 1/2/0  Rackage Review by and Date (Signature): Mall (St. 12/22/09)															
Survey Comments  Survey Comments  Package Review  Package Completed: 11/2/04  Kage Review by and Date (Signature): Machallet Completed: 11/2/04  Survey Comments  Package Review by and Date (Signature): Machallet Completed: 11/2/04															
Survey Comments  Survey Comments  Package Review  Package Completed: 1/3/04, CM  Kage Review by and Date (Signature): Mand CH															
Survey Comments  Survey Comments  Package Review  Package Completed: 1/2/04  Rage Review by and Date (Signature): MANCH St. 12/2/09															
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Package Review															
Package Review  Package Review  Package Review  Package Review by and Date (Signature):  Package Review by and Date (Signature):  Package Review by and Date (Signature):															
veyor(s) Signatures: Rehalf A. Cha.  e Package Completed: 11/2/04, Cha.  kage Review by and Date (Signature): Roul C & 12/22/09							Packag	ze Revie	*						
kage Review by and Date (Signature): Row CER 12/22/09	Surveyor(s) Signatu	res:	Cell D	B		1 C		(							
kage Review by and Date (Signature): Paul CES 12/22/09	Date Package Comp	leted:	11/2	109	2	b	ľ								
	Package Review by	and Dat	e (Signature):	13	Jane	D	B	12/	122/0	6					
				7			9								

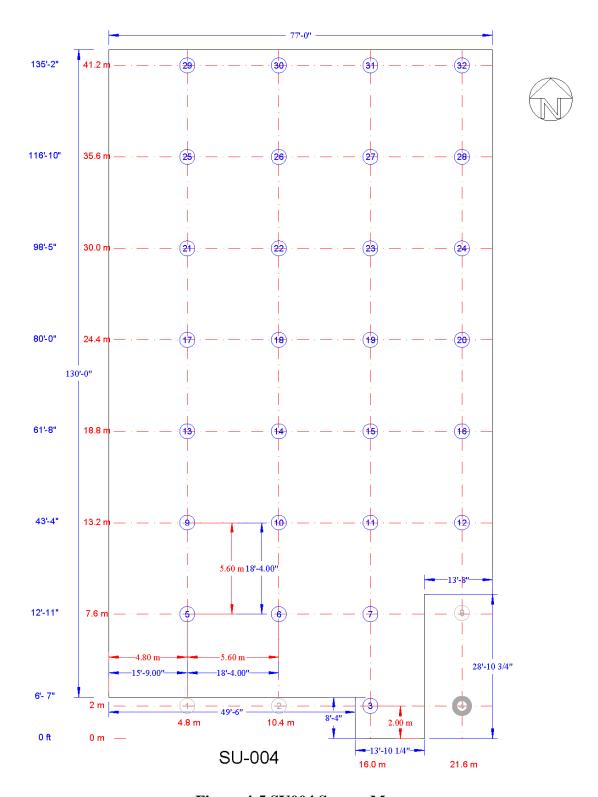
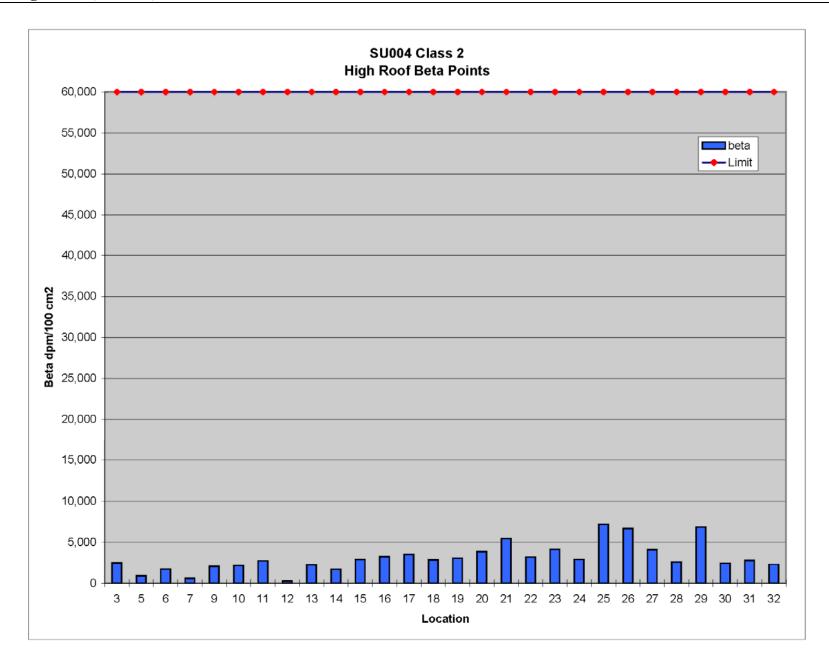


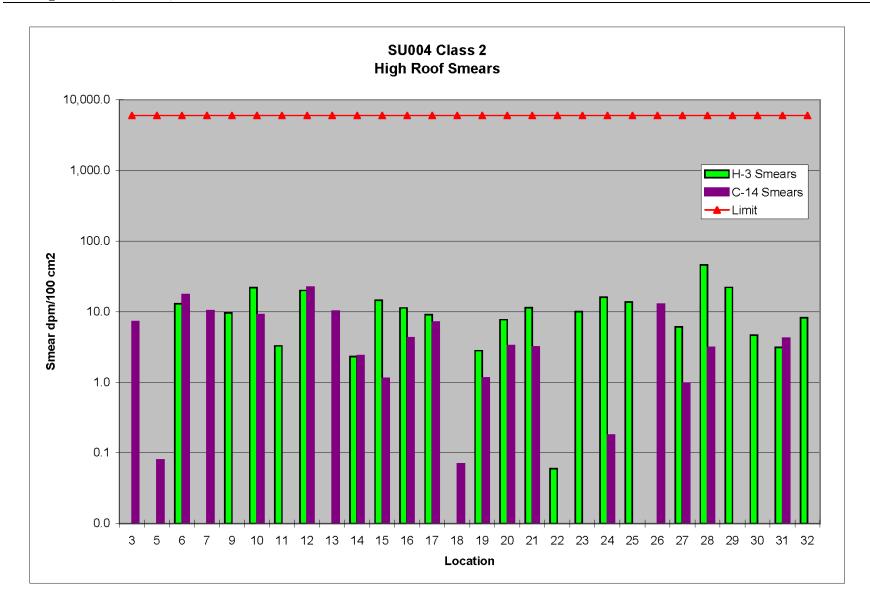
Figure 4-5 SU004 Survey Map

EaglePicher FSS Data Sheet Survey Unit 004 High Roof

Detector **Detector Cal** Detector Type Ludlum 43-68 (beta) Packard Tri-Carb B2555 Detector SN (cm²) Meter Type Meter SN Meter Cal Due Due 119337 `126 9/30/10 2350-1 95359 9/30/10 401663 NA Daily NA NA NA

			В	eta	H-3	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	ıc.*	(dpm/100cm <sup>2</sup> )				
3	R	Roof	2,488	60,000	0.0	6,000	7.3
5	R	Roof	922	60,000	0.0	6,000	0.1
6	R	Roof	1,743	60,000	13.0	6,000	17.6
7	R	Roof	626	60,000	0.0	6,000	10.3
9	R	Roof	2,090	60,000	9.6	6,000	0.0
10	R	Roof	2,158	60,000	21.9	6,000	9.1
11	R	Roof	2,716	60,000	3.3	6,000	0.0
12	R	Roof	245	60,000	20.0	6,000	22.3
13	R	Roof	2,259	60,000	0.0	6,000	10.1
14	R	Roof	1,692	60,000	2.3	6,000	2.4
15	R	Roof	2,868	60,000	14.5	6,000	1.1
16	R	Roof	3,241	60,000	11.3	6,000	4.3
17	R	Roof	3,520	60,000	9.1	6,000	7.2
18	R	Roof	2,843	60,000	0.0	6,000	0.1
19	R	Roof	3,063	60,000	2.8	6,000	1.2
20	R	Roof	3,858	60,000	7.7	6,000	3.3
21	R	Roof	5,440	60,000	11.4	6,000	3.2
22	R	Roof	3,164	60,000	0.1	6,000	0.0
23	R	Roof	4,137	60,000	10.1	6,000	0.0
24	R	Roof	2,902	60,000	16.0	6,000	0.2
25	R	Roof	7,200	60,000	13.7	6,000	0.0
26	R	Roof	6,659	60,000	0.0	6,000	12.8
27	R	Roof	4,112	60,000	6.1	6,000	1.0
28	R	Roof	2,581	60,000	46.0	6,000	3.1
29	R	Roof	6,847	60,000	22.0	6,000	0.0
30	R	Roof	2,462	60,000	4.7	6,000	0.0
31	R	Roof	2,792	60,000	3.1	6,000	4.2
32	R	Roof	2,310	60,000	8.2	6,000	0.0
Average	R	Roof	3,105		9.2		4.3
Standard Deviation	R	Roof	1,715		10.0		5.8
Maximum	R	Roof	7,200		46.0		22.3
* R = Roof, F = Floor, W	= Wall, C = Ce	iling, E = Equip	ment				







#### M2350-1 Download BETA Report

File Name : 00000029 Survey Descri	ription :SU004 Roof Points	
Survey Reason : Final Status		
User ID : RPS2366	Technician Name : Richard Stor	ney
Instrument Model : 2350-1	Instrument S/N: 95359	Instrument Cal. Due : 9/30/2010
Detector Model : 43-68b	Detector S/N : 119337	Detector Cal. Due : 9/30/2010
Measurement Type : BETA	Detector Type: 02200: 126 cm	2 Gas Proportional Detector
Detector Area : 126	Efficiency : 0.0938	Survey Date : 10/24/2009
Minimum Net DPM Observed: -262	Mean Net DPM: 5968	
Maximum Net DPM Observed: 34868	STDEV Observed: 9699	# of Samples Taken: 39
Richard Stoney	Meh P	10-74-2009
Print Name	Signature	10-24-2009 Date
Print Name	Signature	Date

Comments:	All Sc	ans f	Perform	ed res	ilts .	< 1000 cpm 6  pm/100 cm² 1  cpm ÷ 0.093  H, 315 dpm/100	
Backq	round	This	a equiv	elent to	4,3150	pm/100 cm21	
C.DM/0	1 - 490 CJ	iems becky	- 126 c	510 cpm	510	CPM = 0.093	8
	, , ,	1,		4 100	R	Ely	
						1	
					-		_
					-		

Sign-Off PAULELY Paul Elg 11/2/09
Print Name Y Paul Elg 11/2/09
Page 1 of 2

# Duratek Beta Survey Report

Download File Name: 00000029

Package ID(L1)	(L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
ZZZZ	ZZZZZ	0	2,949.0	600	PRBBK	27272	ZZZZZ	14	0	2,495
ZZZZ	ZZZZZ	1	2,829.0	600	PRBBK	ZZZZZ	27777	15	0	2,394
ZZZZ	ZZZZZ	2	3.972.0	60	PRSC1	22272	22772	16	0	33,607
ZZZZ	ZZZZZ	3	3,870.0	60	PRSC1	ZZZZZ	22222	17	0	32,744
2272	ZZZZZ	4	4,040.0	60	PRSC1	ZZZZZ	72777	18	0	34,183
ZZZZ	77777	5	4,121,0	60	PRSC1	ZZZZZ	22222	19	O	34,868
7222	22222	6	2,668.0	600	PRBBK	ZZZZZ	22222	20	0	2,257
SU004	FOT	7	459.0	60	FLDBK	22772	ZZZZZ	21	490	-262
SU004	F01	8	784.0	60	FLDCT	22222	27772	.3	490	2,488
SU004	F01	9	564.0	60	FLDCT	22222	77777	7	490	626
SU004	F01	10	695.0	60	FLOCT	22222	22222	6	490	1,743
SU004	F01	1.1	599.0	60	FLOCT	22722	27777	5	490	922
SU004	F01	12	737.0	60	FLDCT	22222	27777	9	490	2,090
SU004	F01	13	745.0	60	FLDCT	ZZZZZ	22727	10	490	2,158
SU004	F01	14	811.0	60	FLDCT	77777	22222	11	490	2,715
SU004	FOT	15	519.0	60	FLOCT	ZZZZZ	27777	12	490	245
SU004	F01	16	757.0	60	FLDCT	22222	ZZZZZ		490	2,259
SU004	F01	17	690,0	60	FLDCT	22222	22222	14	490	1,692
SU004	FO1	18	829.0	60	FLDCT	22222	22222	15	490	2,868
SU004	F01	19	873.0	60	FLOCT	22222	72777	16	490	3,241
JU004	F01	20	906.0	60	FLDCT	ZZZZZ	22222	17	490	3,520
SU004	F01	21.	826.0	60	FLDCT	ZZZZZ	27222	18	490	2,843
U004	F01	22	852.0	60	FLOCT	77777	ZZZZZ	19	490	3,063
U004	F01	23	946.0	60	FLDCT	22222	77777	20	490	3,858
U004	F01	24	1,133.0	60	FLDCT	22772	27777	21	490	5,440
U004	F01	25	864.0	80	FLDCT	ZZZZZ	22222	22	490	3,164
U004	F01	26	979.0	60	FLDCT	27772	ZZZZZ	23	490	4,137
1004	F01	28	865.0	80	FLDCT	ZZZZZ	27222	25	490	3,173
0004	F01	29	833.0	60	FLDCT	22222	ZZZZZ	24	490	2,902
U004	FO1	30	1,341.0	60	FLDCT	27777	22222	25	490	7,200
U004	F01	31	1,277.0	60	FLOCT	22222	27777	26	490	6,659
U004	F01	32	976.0	60	FLDGT	ZZZZZ	22272	27	490	4,112
U004	F01	33	795.0	60	FLDCT	77.222	77777	28	490	2,581
U004	F01	34	1,311.0	60	FLDCT	ZZZZZ	22272	29	490	6,947
U004	F01	35	781.0	60	FLOCT	ZZZZZ	22722	30	490	2,462
U004	F01	36	820.0	80	FLDCT	27727	22222	31	490	2,792
U004	F01	37	763.0	60	FLDCT	ZZZZZ	ZZZZZ	32	490	2,792
U004	F01	38	512.0	60	FLDBK	77777	27772	33	490	186
U004	F01	39	499.0	60	FLDBK	ZZZZZ	27772	0	490	76

 Beta Flag
 45000 - \_\_\_\_

 Beta Max Flag
 60000 \_\_\_\_\_

Saturday, October 24, 2009

Page 2 of 2

10.00		2009 1 L #:11	5:43			BETA - H-3 &			llger	: Eagle	Page #:	
		1.00							0501	. павте	r rener /	150
		ie: Dua	1 DPM			Nuclid	es: 3H-1	4C		nch Sets		
Bac	kgrou	and Sub	tract: 1	lst	Vial					Low Ener High Ene		3
Reg	ion A	A: 0 B: 12	LL ( .0 - 12. .0 - 15. .0 - 0	0 56	LCR 0 0	25% 0.0 0.0 0.0	BKG 8.98 17.94 0.00					
FSS Coi Del Pro	Ext S Smeancide ay Be tocol	otd Ter ars in ence Ti efore B Data	or: tSII minator: 20 ml UI me(ns): urst(ns) Filename ename: (	Coltim 18 ): N	unt a Gold ormal :\EP\PR					H-3	C-14	
	PID	S#	SMPL_	ID	TIME	CPMA	A:25%	CPMB	B:25%	DPM1	DPM2	t2
11		1			10.00	8,98	21.10	17.94	14.93			424.
38 11	B 1	2	SU4	3	1.00	0.27	2378	5.81	173.9	0.00	7.28	362.
48 11	1	3	SU4	5	1.00	0.00	0.00	0.06	14398	0.00	0.08	348.
01 11	1	4	SU4	6	1.00	6,18	129.7	14.90	78.98	13.00	17.57	409.
82	1	5	SU4	7	1.00	0.00	0.00	8.06	130.8	0.00	10.33	306.
7.9 11	1	6	SU4	9	1.00	3.02	237.9	0.00	0.00	9.60	0.00	401.
36	1	7	SU4	10	1.00	8.04	105.3	8,35	127.0	21.89	9.07	403.
65	1	8	SU4	11	1.00	1.02	648.0	0.00	0.00	3.28	0.00	396.
11	1	9	SU4	12	1.00	9.02	96.40	19,06	65,35	20.03	22.28	411.
11	1	10	SU4	13	1.00	0.89	739.0	8.19	129.0	0.00	10.13	378.
17	1	11	SU4	14	1.00	1,02	648.0	2.06	452.8	2.31	2.40	409.
42 11 69	1	12	SU4	15	1.00	4.54	167.2	1.54	599.1	14.50	1.14	380.
11	2	13	SU4	16	1.00	4.11	181.9	3.97	245.4	11.32	4.26	403.
11	2	14	SU4	17	1.00	3.82	193.6	6.26	162.9	9.05	7.17	420.
98	2	15	SU4	18	1.00	0.02	33329	0.06	14398	0.03	0.07	412.
86 11 78	2	16	SU4	19	1.00	1.02	648.0	1.06	858.9	2.80	1.15	398.
11	2	17	SU4	20	1.00	3.02	237.9	3.06	311.9	7.70	3.32	435.
78	2	18	SU4	21	1.00	3.99	186.6	3.09	309.3	11.36	3.19	401.
94 11 21	2	19	SU4	22	1.00	0.02	33329	0.00	0.00	0.06	0.00	402.
444 146												

16	-		~ ~ .	40	4.00	0.02	401.0	0.00	0.00	10.00	0.00	304.
11	2	21	SU4	24	1.00	5.23	148.6	0.85	1069	16.04	0.18	407.
11	2	22	SU4	25	1.00	4.68	163.1	0.00	0.00	13.73	0.00	440.
55 11 07	2	23	SU4	26	1.00	0.93	704.6	10.15	107.7	0.00	12.81	307.
11 28	2	24	SU4	27	1.00	2.02	341.7	1.06	858.9	6.07	0.98	394.
11 91	3	25	SU4	28	1.00	15.51	64.96	4.57	215.9	46.01	3.12	413.
11 91	3	28	SU4	29	1.00	7.02	117.1	0.00	0.00	22.03	0.00	406.
11	3	27	SU4	30	1.00	1.55	434.9	0.00	0.00	4.66	0.00	427.
11	3	28	SU4	31	1.00	1.52	444.3	3.56	271.1	3.12	4.19	425.
11	3	29	SU4	32	1.00	2.82	252.4	0.26	3481	8.20	0.00	439.
12										H-3 DPM-1	C-1H DPM-2	

## 4.3.5 SU005-Low Roof

This was a Class 3 survey unit.

Summary results are provided in Table 4-6 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

**Table 4-6: SU005 Summary Results** 

Summary	Beta	Beta Scan		
Survey Unit 005	Fixed Reading	Maximums*	H-3 Smear	C-14 Smear
Low Roof, Class 3	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )
Number	30	2	30	30
Average	1,729	3,431	3	3
Standard Deviation	480	N/A	13	3
Maximum	2,758	4,104	71	12

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



### FSS Survey Package Worksheet for EaglePicher SU005

Package Identification No.: SU05F/SU05S	Prepared by: Paul C. Ely
Location: Building Low Roof	Date Prepared: 9/30/2009
Area Classification: Class 3	Signature: Paul Ely

#### Area Description

The survey area includes the Building Low Roof.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

#### General Survey Instructions

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - $\varepsilon_t$ , the total beta efficiency =  $\varepsilon_i * \varepsilon_s$
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 25% scan of roof for beta contamination.
- Perform direct beta surface activity measurements at each measurement location. Mark and the survey location on
  the walls with a felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the
  survey unit. Random survey locations were generated for this class 3 survey unit.
- 4. Collect a removable surface activity sample (smear) over an area of 100 cm² in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken. The roof has a graveled surface and will not be easy to smear.

Rev. 0

Survey Package Worksheet SU05F/SU05S (cont'd)

							Special Instructions	Instru	tctions						
Sou The 3,00 Peri plas Log cpm	Source check instrumentation to C- The static MDC for total beta activi 3,000 dpm/100 cm². Perform a minimum of three one-m plastic shield on the survey surface. Log scan measurements or record in cpm on a Grid Scan Record.	nstrument C for total cm². mum of th n the surv urements of Scan Reco	E 8 0 3 3 3	for bel	to C-14 for beta measurements. activity measurements shall be less than me-minute field backgrounds using the rface. ord maximum scan measurement results	ments. all be Ic mds usi	sss than ng the t results in	• •	Random the attac measure location The atta	Randomly generated the attached survey is measurement location location on the map. The attached map pr	ated mea. ey map. cation to t nap. p provide	Surement a If any locs the nearest s measurer	nd samplin ution is inac usable loca nent and sa	Randomly generated measurement and sampling locations are indicated on the attached survey map. If any location is inaccessible, offset the measurement location to the nearest usable location and mark the survey location on the map.  The attached map provides measurement and sampling locations.	indicated of the survey the survey ns.
				Sur	Survey Performance (Initial and date as each item is completed)	rmance	(Initial a	ind date	as each	item is c	complete	(p			
	Location Codes	les			-		-	-	-	-				Smear	
7	1.2	97	Description	Scan	Tech	Direct	Survey	Alpha Alpha	Survey	Alpha Scan	Survey	Direct Gamma	Survey	Gross (Liq. Scint.)	Survey
						Eagl	EaglePicher SU005 Class 3 Area	U005 C	lass 3 Ar	ea.					
Package ID	Surface or Structure	Material Code			Initial & Date	960 sec	Initial & Date	@60 sec	Initial & Date		Initial & Date	@100 cm	Initial & Date	β	Initial & Date
SU05F	R0001	B9999	Roof	N/A	MAR	30	10-24-09	N/A	N/A	N/A	N/A	N/A	N/A	30	455
SCOOS	R0001	B9999	Roof	25%		N/A	MAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Location Codes  General Beta Survey Direct Survey Direct Survey Alpha Tech Scan Tech S	Alpha Survey Direct Survey Scan Tech Gamma Tech	Smear Gross h (Liq. Scint.)
Survey Comments		
7 1 7 10 Package Review		
chat to		
Package Review by and Date (Signature): Aul ER, 12/23/09		

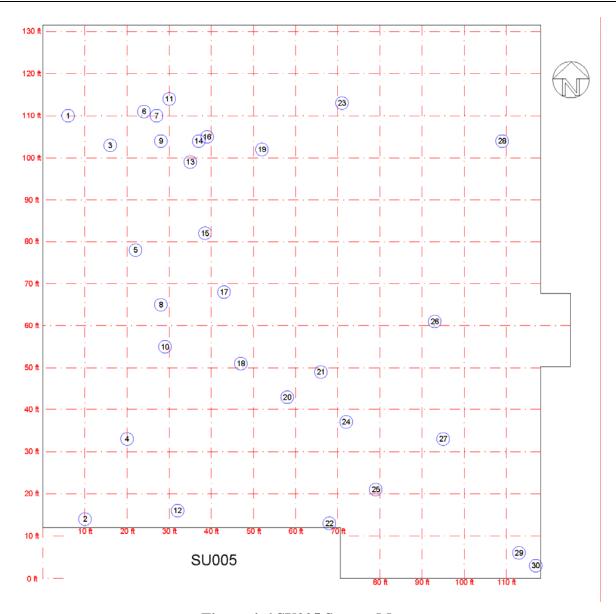
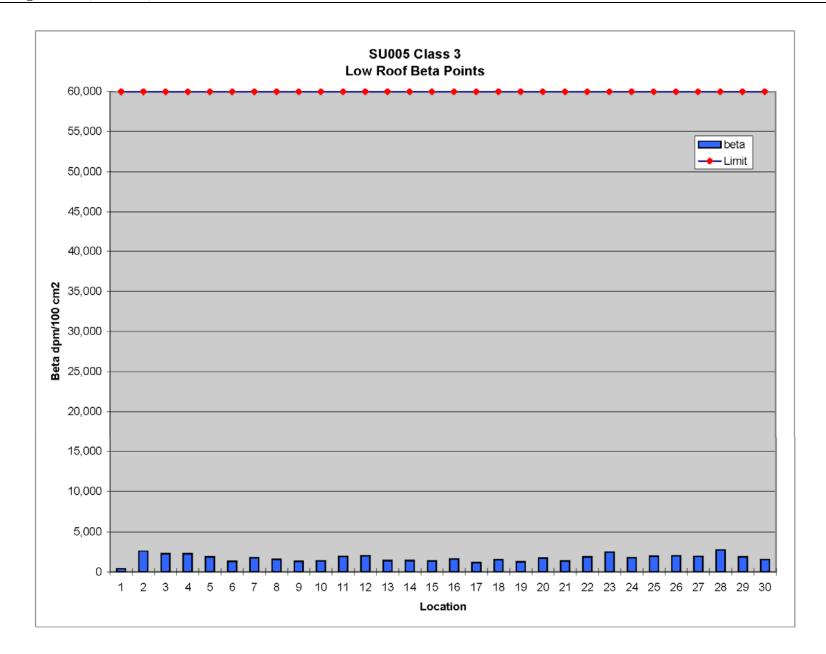


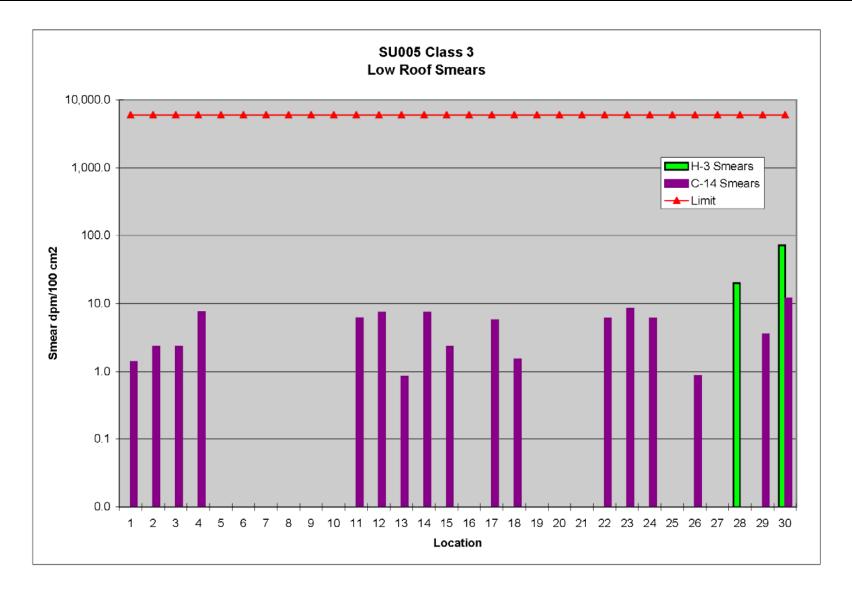
Figure 4-6 SU005 Survey Map

EaglePicher FSS Data Sheet Survey Unit 005 Low Roof

		Detector	Detector Cal			
Detector Type	Detector SN	(cm²)	Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

			В	eta	H-3	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )				
1	R	Roof	381	60,000	0.0	6,000	1.4
2	R	Roof	2,606	60,000	0.0	6,000	2.3
3	R	Roof	2,284	60,000	0.0	6,000	2.3
4	R	Roof	2,284	60,000	0.0	6,000	7.4
5	R	Roof	1,870	60,000	0.0	6,000	0.0
6	R	Roof	1,320	60,000	0.0	6,000	0.0
7	R	Roof	1,785	60,000	0.0	6,000	0.0
8	R	Roof	1,557	60,000	0.0	6,000	0.0
9	R	Roof	1,328	60,000	0.0	6,000	0.0
10	R	Roof	1,396	60,000	0.0	6,000	0.0
11	R	Roof	1,921	60,000	0.0	6,000	6.1
12	R	Roof	2,039	60,000	0.0	6,000	7.3
13	R	Roof	1,413	60,000	0.0	6,000	0.9
14	R	Roof	1,421	60,000	0.0	6,000	7.4
15	R	Roof	1,379	60,000	0.0	6,000	2.3
16	R	Roof	1,608	60,000	0.0	6,000	0.0
17	R	Roof	1,185	60,000	0.0	6,000	5.7
18	R	Roof	1,515	60,000	0.0	6,000	1.5
19	R	Roof	1,269	60,000	0.0	6,000	0.0
20	R	Roof	1,718	60,000	0.0	6,000	0.0
21	R	Roof	1,379	60,000	0.0	6,000	0.0
22	R	Roof	1,887	60,000	0.0	6,000	6.1
23	R	Roof	2,454	60,000	0.0	6,000	8.5
24	R	Roof	1,760	60,000	0.0	6,000	6.1
25	R	Roof	1,963	60,000	0.0	6,000	0.0
26	R	Roof	2,014	60,000	0.0	6,000	0.9
27	R	Roof	1,955	60,000	0.0	6,000	0.0
28	R	Roof	2,758	60,000	19.9	6,000	0.0
29	R	Roof	1,870	60,000	0.0	6,000	3.6
30	R	Roof	1,548	60,000	71.2	6,000	11.9
Average	R	Roof	1,729		3		3
Standard Deviation	R	Roof	480		13		3
Maximum	R	Roof	2,758		71		12
* R = Roof, F = Floor, W	= Wall, C = Ce	iling, E = Equip	ment				







M2350-1 Download BETA Report

File Name : 00000030 Survey Descr	ription :SU005 Points 1-30 on Roof	
Survey Reason : Final Status		
User ID : RPS2366	Technician Name : Richard Stor	ney
Instrument Model : 2350-1	Instrument S/N : 95359	Instrument Cal. Due : 9/30/2010
Detector Model : 43-68b	Detector S/N: 119337	Detector Cal. Due : 9/30/2010
Measurement Type : BETA	Detector Type: 02200: 126 cm	2 Gas Proportional Detector
Detector Area : 126	Efficiency: 0.0938	Survey Date : 10/24/2009
Minimum Net DPM Observed: -1476	Mean Net DPM: 2342	
Maximum Net DPM Observed: 31568	STDEV Observed: 5154	# of Samples Taken: 35
Richard Stoney	Robert Am	10-24-2009
Print Name	Signature	Date
Print Name	Signature	Date

This is say	Scan Re	sults < 10	000 cpm/per	probe area. pm - 515 cpm (baltyon (Efficiency) : R6 cm 2
= 485 Vc)	m. 4850	pm = 0:09	38 cpm/dpm	(Effecting) : DGan 2
100 cm	= 4,104 4	m/100 mm,	perg	,

Sign-Off PANLELY Page 11/2/09
Print Name Page of 2

# Duratek Beta Survey Report

Download File Name: 00000030

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU005	F01	0	499,0	60	FLDBK	ZZZZZ	77777	1	515	-135
SU005	F01	1	823.0	60	FLDCT	ZZZZZ	ZZZZZ	2	515	2,606
SU005	F01	2	785.0	60	FLDCT	ZZZZZ	22222	4	515	2,284
SU005	F01	3	756.0	60	FLDCT	22222	22222	12	515	2,039
SU005	F01	4	738.0	80	FLDCT	22222	22222	22	515	1,887
SU005	F01	5	747.0	60	FLDCT	ZZZZZ	ZZZZZ	25	515	1,963
SU005	F01	6	745.0	60	FLDCT	27777	22777	27	515	1,955
SU005	F01	7	723.0	60	FLDCT	ZZZZZ	77777	24	515	1,760
SU005	F01	8	736,0	60	FLDCT	22272	27272	29	515	1,870
SU005	F01.	9	698.0	60	FLDCT	22222	27272	30	515	1,548
SU005	F01	10	718.0	60	FLDCT	22722	22222	20	515	1,718
SU005	F01	11	678.0	80	FLDCT	22222	77777	21	515	1,379
SU005	F01	12	694.0	60	FLOCT	22222	ZZZZZ	18	515	1,515
SU005	F01	13	753.0	60	FLDCT	77777	77777	26	515	2,014
SU005	F01	14	841.0	60	FLDCT	22222	ZZZZZ	28	515	2,758
SU005	F01	15	535.0	60	FLDBK	22222	ZZZZZ	28	515	169
SU005	F01	16	805.0	60	FLDCT	22222	27777	23	515	2.454
SU005	F01	17	665.0	60	FLDCT	22222	77777	19	515	1,269
SU005	FO1	18	705.0	60	FLDCT	ZZZZZ	27777	16	515	1,608
SU005	F01	19	682.0	60	PLDCT	ZZZZZ	27777	13	515	1,413
SU005	F01	20	683.0	60	FLDCT	ZZZZZ	27777	14	515	1,421
SU005	F01	21	672.0	80	FLDCT	77777	27772	9	515	1,328
SU005	F01	22.	671.0	50	FLDCT	ZZZZZ	22222	6	515	1,320
SU005	F01	23	726.0	60	FLOCT	22272	22272	7	515	1,785
SU005	F01	24	742.0	60	FLDCT	22222	ZZZZZ	11	515	1,921
SU005	FOT	25	785 0	60	FLDCT	22222	27272	3	515	2,284
SU005	F01	26	560.0	60	FLDCT	22222	ZZZZZ	1	516	381
U005	F01	27	736.0	60	FLDCT	22222	ZZZZZ	5	515	1,870
U005	F01	28	678.0	60	FLOCT	77272	27777	15	515	1,379
U005	FOT	29	655.0	60	FLDCT	77777	22222	17	515	1,185
U005	F01	30	699.0	60	FLDCT	ZZZZZ	22727	8	515	1,557
U005	F01	31	680.0	60	FLDCT	22222	ZZZZZ	10	515	1,396
U005	F01	32	511.0	60	FLDBK	22222	ZZZZZ	10	515	-34
LU005	F01	33	3,406.0	800	PTBBK	22222	22222	11	515	-1,476
U005	F01	34	4,248.0	60	PTSC1	77772	27222	12	515	31,568

Beta Flag	45000
Beta Max Flag	60000

Saturday, October 24, 2009

Page 2 of 2

		2009 <u>1</u> L #:24	4:31			BETA - H-3 &			User	: Eagle	Page #	
Time Data		1.00 le: Dua	1 DPM			Nuclid	es: 3H-1	4C		nch Sets Low Energ	gy: 3H	
Back	grou	ind Sub	tract: 1	st	Vial					High Ener		
Regi Regi Regi	on E	A: 0 B: 12	LL U .0 - 12. .0 - 15	6	LCR 0 0	25% 0.0 0.0 0.0	BKG 11.25 16.15 0.00		Low Ro	of		
FSS Coin Dela Prot	xt S Smea cide y Be ocol	otd Terminate in the control of the	or: tSIE minator: 20 ml Ul me(ns): urst(ns) Filename ename: C	Co tim 18 : N	unt a Gold ormal :\EP\PR							
						#-3		C-14		H-3	C-14	
P# IE F		S#	SMPL_	ID	TIME	CPMA	A:25%	CPMB	B:25%	DPM1	DPM2	ts
24	8 B	1			10.00	11.25	18.86	16.15	15.74			416.
24	8	2	SU5	1	1.00	0.00	0.00	1.10	792.7	0.00	1.39	345.
46 24	8	3	SU5	2	1.00	0.00	0.00	1.85	479.1	0.00	2.31	409.
54 24	8	4	SUS	3	1.00	0.00	0.00	1.85	479.1	0.00	2.32	383.
53 24	8	5	SU5	4	1.00	0.00	0.00	5.85	166.2	0.00	7.43	337.
86 24	8	6	SUS	5	1.00	0,00	0.00		0.00	0.00	0.00	
26	00	7	SU5		1.00	0.00	0.00	0.00		0.00	0.00	
64 24		8	SU5		1.00		0.00	0.00		0.00	0.00	
80 24	8	9	SUS		1.00	0.00	0.00		0.00	0.00	0.00	
73	8	10	SU5		1.00							
27						0.00	0.00		0.00	0.00	0.00	
24 96	8	11	SU5		1,00	0.00	0.00		0.00	0.00	0.00	
24 47	8	12	SU5		1.00	0.00	0.00		196.2	0.00	6.12	
24 15	9	13	SU5	12	1.00	0.00	0.00	5.85	166.2	0.00	7.30	407.
24 40	9	14	SU5	13	1.00	0.00	0.00	0.66	1300	0.00	0.85	292.
24 68	9	15	SU5	14	1.00	0.00	0.00	5.85	166.2	0.00	7.38	362.
24	9	16	SU5	15	1.00	0.00	0.00	1.85	479.1	0.00	2.33	358.
43 24	9	17	SU5	16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	399.
66 24	9	18	SU5	17	1.00	0.00	0.00	4.53	208.6	0.00	5.70	371.
51 24 12	9	19	SU5	18	1.00	0.00	0.00	1.21	721.3	0.00	1.51	386.

U	40	200	40	1.00	0.00	0.00	0.00	0.00	0.00	0.00	JUJ.
9	21	SUS	20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	411.
					200		0.000	27.55	24.55		
9	22	SU5	21	1.00	0.00	0.00	0.00	0.00	0.00	0.00	426.
		1.50				17.15					
9	23	SU5	22	1.00	0.00	0.00	4.85	196.2	0.00	6.06	399.
	0.4	0115	00	1 00	0.00						322
9	24	505	23	1.00	0.00	0.00	6.83	145.3	0.00	8.52	403.
10	25	CIIE	24	1 00	0 00	0.00	4 05	100 0	0 00	0 00	200
10	45	500	24	1.00	0.00	0.00	4.00	130.2	0.00	0.00	390.
10	28	SH5	25	1 00	0.00	0 00	0.00	0.00	0.00	0.00	252
10		500	20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	555.
10	27	SU5	26	1.00	0.00	0.00	0.69	1239	0.00	0.87	363
									0.00	0.01	
10	28	SU5	27	1.00	0.00	0.00	0.00	0.00	0.00	0.00	434.
10	29	SU5	28	1.00	5.51	153.4	0.00	0.00	19.90	0.00	351.
										2.02	
10	30	505	29	1.00	0.00	0.00	2.85	318.8	0.00	3.57	388.
10	0.1	CHE	20	1 00	22 05	E0 00	10 55	07 70	E1 60	44 00	000
10	31	505	30	1.00	22.05	53.22	12.55	01.12	71.20	11.88	363.
									73	Cul	
									H-3	C-17	
									17PM-1	DAMZ	
	9 9 9 9 10 10	9 21 9 22 9 23 9 24 10 25 10 26 10 27 10 28 10 29	9 21 SU5 9 22 SU5 9 23 SU5 9 24 SU5 10 25 SU5 10 26 SU5 10 27 SU5 10 28 SU5 10 29 SU5 10 30 SU5	9 21 SU5 20 9 22 SU5 21 9 23 SU5 22 9 24 SU5 23 10 25 SU5 24 10 26 SU5 25 10 27 SU5 26 10 28 SU5 27 10 29 SU5 28 10 30 SU5 29	9 21 SU5 20 1.00 9 22 SU5 21 1.00 9 23 SU5 22 1.00 9 24 SU5 23 1.00 10 25 SU5 24 1.00 10 26 SU5 25 1.00 10 27 SU5 26 1.00 10 28 SU5 27 1.00 10 29 SU5 28 1.00 10 30 SU5 29 1.00	9       21       SU5       20       1.00       0.00         9       22       SU5       21       1.00       0.00         9       23       SU5       22       1.00       0.00         9       24       SU5       23       1.00       0.00         10       25       SU5       24       1.00       0.00         10       26       SU5       25       1.00       0.00         10       27       SU5       26       1.00       0.00         10       28       SU5       27       1.00       0.00         10       29       SU5       28       1.00       5.51         10       30       SU5       29       1.00       0.00	9       21       SU5       20       1.00       0.00       0.00       0.00         9       22       SU5       21       1.00       0.00       0.00       0.00         9       23       SU5       22       1.00       0.00       0.00       0.00         9       24       SU5       23       1.00       0.00       0.00       0.00         10       25       SU5       24       1.00       0.00       0.00       0.00         10       26       SU5       25       1.00       0.00       0.00       0.00         10       27       SU5       26       1.00       0.00       0.00       0.00         10       28       SU5       27       1.00       0.00       0.00       0.00         10       29       SU5       28       1.00       5.51       153.4         10       30       SU5       29       1.00       0.00       0.00	9       21       SU5       20       1.00       0.00       0.00       0.00         9       22       SU5       21       1.00       0.00       0.00       0.00         9       23       SU5       22       1.00       0.00       0.00       4.85         9       24       SU5       23       1.00       0.00       0.00       6.83         10       25       SU5       24       1.00       0.00       0.00       4.85         10       26       SU5       25       1.00       0.00       0.00       0.00         10       27       SU5       26       1.00       0.00       0.00       0.00         10       28       SU5       27       1.00       0.00       0.00       0.00         10       29       SU5       28       1.00       5.51       153.4       0.00         10       30       SU5       29       1.00       0.00       0.00       2.85	9       21       SU5       20       1.00       0.00       0.00       0.00       0.00         9       22       SU5       21       1.00       0.00       0.00       0.00       0.00         9       23       SU5       22       1.00       0.00       0.00       4.85       196.2         9       24       SU5       23       1.00       0.00       0.00       6.83       145.3         10       25       SU5       24       1.00       0.00       0.00       4.85       196.2         10       26       SU5       25       1.00       0.00       0.00       0.00       0.00         10       27       SU5       26       1.00       0.00       0.00       0.69       1239         10       28       SU5       27       1.00       0.00       0.00       0.00       0.00         10       29       SU5       28       1.00       5.51       153.4       0.00       0.00         10       30       SU5       29       1.00       0.00       0.00       2.85       318.8	9       21       SU5       20       1.00       0.00       0.00       0.00       0.00       0.00         9       22       SU5       21       1.00       0.00       0.00       0.00       0.00       0.00         9       23       SU5       22       1.00       0.00       0.00       4.85       196.2       0.00         9       24       SU5       23       1.00       0.00       0.00       6.83       145.3       0.00         10       25       SU5       24       1.00       0.00       0.00       4.85       196.2       0.00         10       26       SU5       24       1.00       0.00       0.00       0.00       0.00       0.00       0.00         10       27       SU5       26       1.00       0.00       0.00       0.69       1239       0.00         10       28       SU5       27       1.00       0.00       0.00       0.00       0.00       0.00       0.00         10       29       SU5       28       1.00       5.51       153.4       0.00       0.00       19.90         10       30       SU5       29	9       21       SU5       20       1.00       0.00       8.06       9       24       SU5       23       1.00       0.00       0.00       6.83       145.3       0.00       8.52       10       25       SU5       24       1.00       0.00       0.00       4.85       196.2       0.00       6.06       6.06         10       26       SU5       24       1.00       0.00

# 4.3.6 SU006-Mezzane Ceiling

This was a Class 3 survey unit.

Summary results are provided in Table 4-7 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

**Table 4-7: SU006 Summary Results** 

Summary Survey Unit 006 Mezzanine Ceiling, Class 3	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums* (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm²)
Number	30	2	30	30
Average	3,478	11,045	16.2	16.6
Standard Deviation	1,747	N/A	9.9	25.1
Maximum	9,210	12,881	37.5	127.9

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



### FSS Survey Package Worksheet for EaglePicher SU006

Package Identification No.: SU06F/SU06S	Prepared by: Paul C. Ely
Location: Ceiling above Mezzanine	Date Prepared: 9/30/2009
Area Classification: Class 3	Signature: Pau C Ele

#### Area Description

The survey area includes the ceiling.

# **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

# **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - ε<sub>t</sub>, the total beta efficiency = ε<sub>i</sub> \* ε<sub>s</sub>
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 10% scan of ceiling for beta contamination.
- Perform direct beta surface activity measurements at each measurement location. All ceiling surveys locations are
  marked on floor. All surveys locations are referenced from the southwest corner of the survey unit. Random
  survey locations were generated for this class 3 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm<sup>2</sup> in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it is taken.

Rev. 0

Page 1 of 3

Survey Package Worksheet SU06F/SU06S (cont'd)

							Specia	opecial man actions	CHOUS						
Sour The 3,00 Per Per Copin Co	Source check instrumentation to C- The static MDC for total beta activi 3,000 dpm/100 cm <sup>2</sup> .  Perform a minimum of three one-m plastic shield on the survey surface.  Log scan measurements or record in cpm on a Grid Scan Record.	nstrument C for total cm². mum of th n the surve urements c Scan Reco	Source check instrumentation to C-14 for beta measurements.  The static MDC for total beta activity measurements shall be less than 3,000 dpm/100 cm².  Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in cpm on a Grid Scan Record.	for bet measun ite fiek imum :	to C-14 for beta measurements. activity measurements shall be ne-minute field backgrounds us rface. ord maximum scan measureme	ments. nall be le nads usi	ss than ng the results ir		Randorr the attac measure location The atta based or	Randomly generated the attached survey rangesurement location location on the map. The attached map prassed on marked floo	Randomly generated measureme the attached survey map. If any measurement location to the nea location on the map.  The attached map provides ceilin based on marked floor locations.	urement a If any loca he nearest s ceiling n ations.	und samplin ation is inac usable loca neasuremen	Randomly generated measurement and sampling locations are indicated on the attached survey map. If any location is inaccessible, offset the measurement location to the nearest usable location and mark the survey location on the map.  The attached map provides ceiling measurement and sampling locations based on marked floor locations.	indicated on the the survey locations
				Sur	Survey Performance (Initial and date as each item is completed)	rmance	(Initial s	und date	as each	item is c	ompletec	0			
	Location Codes	les				-			-		-			Smear	
3	77	F6	Description	Scan	Survey	Direct	Survey	Direct	Survey	Alpha	Survey	Direct Gamma	Survey Tech	Gross (Liq. Scint.)	Survey Tech
						Eagl	EaglePicher SU006 Class 3 Area	10000 C	lass 3 Ar	ea.					
Package 1D	Surface or Structure	Material Code			Initial & Date	3ec	Initial & Date	@60 sec	Initial & Date		Initial & Date	@100 cm	Initial & Date	В	Initial & Date
SU06F	C01	B0012	Ceiling	N/A	NAME	30	67.49	N/A	N/A	N/A	N/A	N/A	N/A	30	4.5
S900S	C01	B0012	Ceiling	%01	10.28.01	N/A	NAE	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A
					Í										

Location Codes	General Beta Survey Direct Survey Alpha Tech Scan  Survey Comments  Survey Comments	Direct Survey Direct Survey Alpha Survey Beta Tech Alpha Tech Scan Tech		
Scan Tech Beta Tech Alpha Tech Scan Tech Gamma Tech (Liq. Scint.)  Survey Comments  Survey Comments  Survey Comments  34   04	Description Scan Tech Beta Tech Alpha Tech Scan Survey Comments  Survey Comments  Package Review	Beta Tech Alpha Tech Scan Tech		H
Survey Comments  Survey Comments  Package Review  A / 04  A / 24 / 04			Survey	_
Survey Co 34/04  Package				
Survey Co				
Survey Co Survey Co 34/04  AMUCER				
Package  A 104  FAUCER				
Package 34/04 fauld Ell	My Charles	Survey Comments		
Package 34/04 Fauld Fla	The Contract of the Contract o			
Package 34/04 Faul Ell	The Contraction			
Package 34/04 fauld 54	The Charles			
Package 34/04 fauld 5%	July (1) 21,00			
29/09 faul (5/4)	The desira	Package Review		
29/09 faul (5/4)	Jan de 130	0		
faul ( Ele	6 0	09		
0	faul CFG	LCFR		
	0	0		

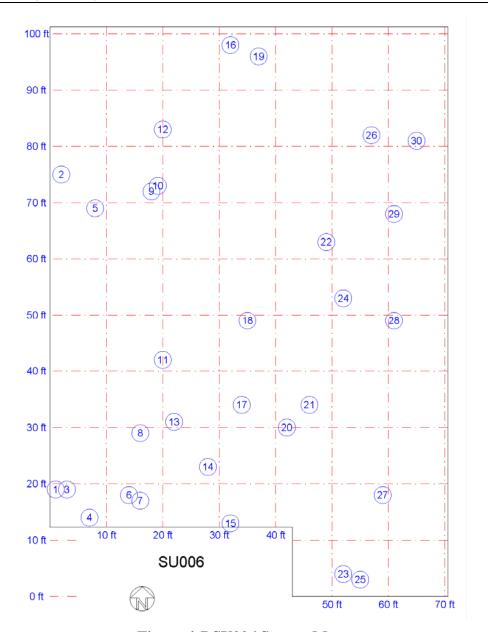
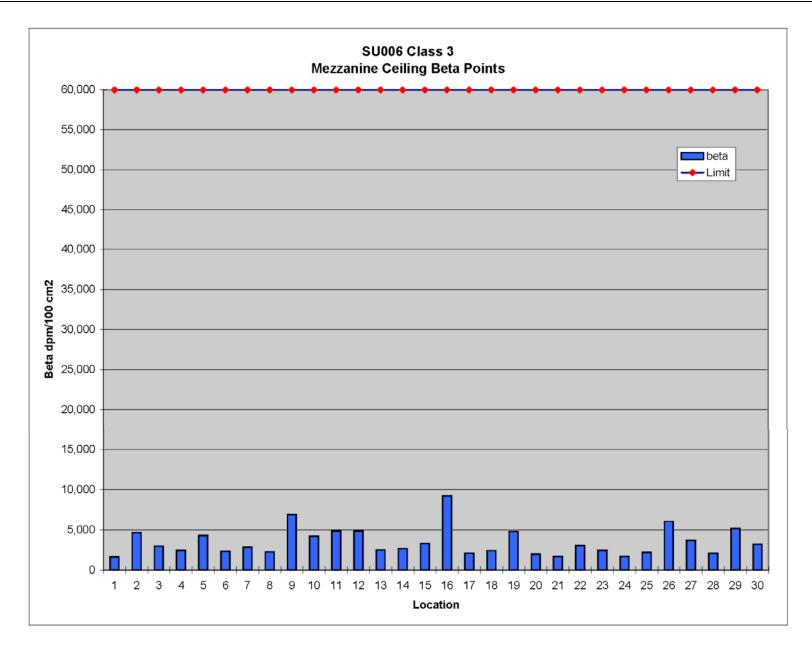


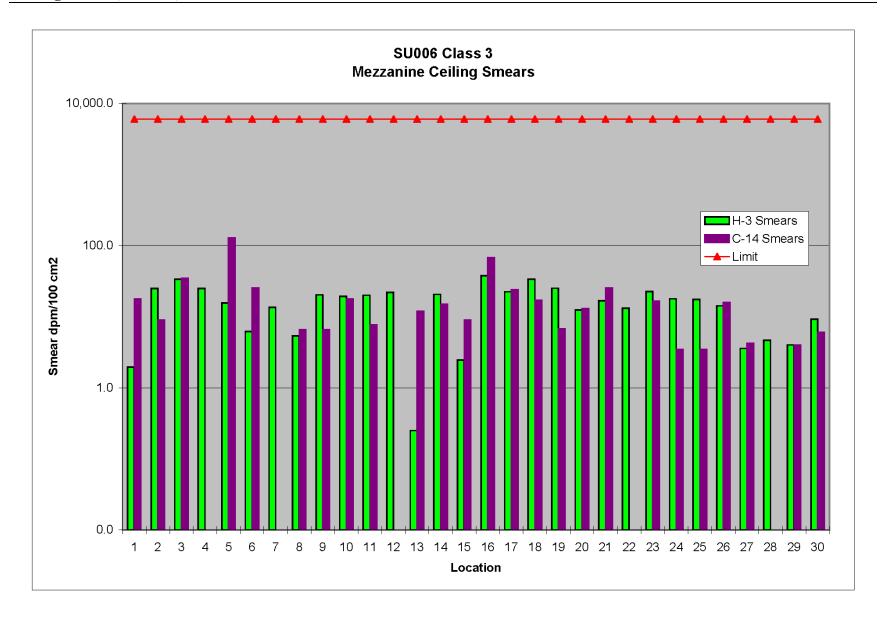
Figure 4-7 SU006 Survey Map

EaglePicher FSS Data Sheet Survey Unit 006 Mezzanine Ceiling

Detector Detector Cal Meter Type 2350-1 NA Meter SN 117566 Detector Type Detector SN (cm²) Due Meter Cal Due Ludlum 43-68 (beta)
Packard Tri-Carb B2555 126 NA 091028 9/28/10 9/28/10 401663 Daily NA NA

			В	eta	H-	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	oc.*	(dpm/100cm <sup>2</sup> )				
1	С	Ceiling	1,623	00,000	2.0	6,000	17.7
2	C	Ceiling	4,658	000,00	25.0	6,000	8.9
3	С	Ceiling	2,960	000,00	33.5	6,000	34.8
4	C	Ceiling	2,430	60,000	24.9	6,000	0.0
5	С	Ceiling	4,318	60,000	15.6	6,000	127.9
6	C	Ceiling	2,324	60,000	6.2	6,000	25.5
7	С	Ceiling	2,822	000,00	13.5	6,000	0.0
8	C	Ceiling	2,249	000,00	5.4	6,000	6.6
9	С	Ceiling	6,875	000,00	20.3	6,000	6.5
10	С	Ceiling	4,191	60,000	19.3	6,000	17.9
11	С	Ceiling	4,849	60,000	20.0	6,000	7.7
12	С	Ceiling	4,849	60,000	22.1	6,000	0.0
13	С	Ceiling	2,515	60,000	0.3	6,000	12.0
14	С	Ceiling	2,663	000,00	20.6	6,000	15.0
15	С	Ceiling	3,310	000,00	2.5	6,000	8.9
16	C	Ceiling	9,210	60,000	37.5	6,000	68.1
17	C	Ceiling	2,101	60,000	22.5	6,000	23.9
18	С	Ceiling	2,409	60,000	33.8	6,000	16.9
19	C	Ceiling	4,785	60,000	25.1	6,000	6.7
20	С	Ceiling	1,963	000,00	12.4	6,000	12.9
21	С	Ceiling	1,666	000,00	16.8	6,000	25.4
22	C	Ceiling	3,056	60,000	13.2	6,000	0.0
23	С	Ceiling	2,430	60,000	22.5	6,000	16.5
24	C	Ceiling	1,708	60,000	17.8	6,000	3.4
25	C	Ceiling	2,186	000,00	17.5	6,000	3.5
26	C	Ceiling	6,048	000,00	14.2	6,000	15.8
27	С	Ceiling	3,714	000,00	3.6	6,000	4.2
28	С	Ceiling	2,069	000,00	4.7	6,000	0.0
29	С	Ceiling	5,178	60,000	4.0	6,000	4.0
30	C	Ceiling	3,183	60,000	9.2	6,000	6.0
Average	С	Ceiling	3,478		16.2		16.6
Standard Deviation	O	Ceiling	1,747		9.9		25.1
Maximum	С	Ceiling	9,210		37.5		127.9
* R = Roof, F = Floor, W =	= Wall, C = Ce	iling, E = Equip	oment				







M2350-1	Download	BETA	Report
---------	----------	------	--------

Survey Reason : Final Status		
User ID : RLS2098	Technician Name : Lee Severtso	n
Instrument Model : 2350-1	Instrument S/N : 117566	Instrument Cal. Due : 9/28/2010
Detector Model : 43-68b	Detector S/N : 091028	Detector Cal. Due : 9/28/2010
Measurement Type : BETA	Detector Type: 02200: 126 cm2	Gas Proportional Detector
Detector Area : 126	Efficiency: 0.0748	Survey Date : 10/27/2009
Minimum Net DPM Observed: -110	Mean Net DPM: 4273	
Maximum Net DPM Observed, 46643	STDEV Observed: 7518 # of Samples Taken: 36	

Lee Severtson	4.	14-27-09
Print Name	Signature	Date
Print Name	Signature	Date

no	scan	reading	5 found	7 1500	Cpm
This is	quivelent .	to 12,881 del	100 and , 1	7 1500 500 (pm - 266 cpm my) = 126 cm 2	(backgrenn)
2 1/4/1 C	- 17 ag	14 CPM 7 0.0748	Waydom LEfficien	14) -126 cm	- 1
10000	- 101 60	C CFOR/ICC COM	- Ly		
	100				

Sign-Off PAIL Ety Paul Ely 10/29/09
Print Name

Page 1 of 7

# Duratek Beta Survey Report

Download File Name: 00000035

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU06F	C01	0	280.0	60	FLDBK	B0012	ZZZZZ	1	286	-64
SU06F	C01	1	515.0	60	FLDCT	B0012	22272	23	286	2,430
SU06F	C01	2	492.0	60	FLDCT	B0012	ZZZZZ	25	286	2,186
SUOGF	C01	3	836.0	60	FLDCT	B0012	22222	27	286	3,714
SUGGF	C01	4	481.0	60	FLDCT	B0012	22222	28	286	2,069
SU06F	C01	5	447.0	60	FLDCT	B0012	27222	24	286	1,708
SUDEF	C01	6	774.0	60	FLDCT	80012	77777	29	286	5,178
SUOBF	C01	7	574.0	60	FLOCT	B0012	27272	22	286	3,056
SUOSF	C01	8	586.0	60	FLDCT	B0012	77777	30	286	3,183
SUDGE	COT	9	856.0	80	FLOCT	B0012	22222	26	286	6,048
SU08F	C01	10	1,154.0	80	FLDCT	80012	ZZZZZ	16	288	9,210
SU06F	C01	11	737.0	60	FLDCT	80012	22272	19	286	4,785
SUGGF	C01	12	743.0	60	FLOCT	B0012	22222	12	286	4,849
SU06F	COL	13	934.0	60	FLOCT	B0012	22777	9	288	6,875
SUGGE	C01	14.	681.0	60	FLDCT	B0012	27777	10	286	4,191
SU06F	C01	15	301.0	60	FLDBK	B0012	22222	2	286	159
SU06F	C01	16	725.0	60	FLDCT	B0012	27272	2	286	4,659
SU06F	C01	17	693.0	60	FLOCT	B0012	ZZZZZ	5	286	
SU06F	C01	18	743.0	80	FLUCT	B0012	ZZZZZ	11	286	4,315 4,849
SU06F	C01	19	513.0	60	FLDCT	80012	22272	18	286	100
SUOSF	C01	20	484.0	60	FLDCT	B0012	22722	17	286	2,409
SUOSE	COI	21	443.0	60	FLDCT	B0012	22222	21	286	2,101
SU06F	COI	22	471.0	60	FLOCT	B0012	ZZZZZ	20	286	1,668
SU06F	C01	23	523.0	60	FLDCT	80012	77777	13	286	1,963
SUGGE	C01	24	498.0	60	FLDCT	B0012	ZZZZZ	8	286	2,515
SUOSF	C01	25	537 0	60	FLDCT	B0012	27222	14		2,249
SUDOF	C01	26	598.0	60	FLOCT	B0012	77777	15	286 286	2,663
SUDSF	C01	27	439.0	60	FLOCT	B0012	27772	1		3,310
SU06F	C01	28	565.0	60	FLDCT	B0012	22722		286	1,623
SU06F	C01	29	515.0	60	FLDCT	B0012	22222	3	286	2,960
SUOSF	C01	30	505.0	60	FLDCT	B0012	ZZZZZ	4	286	2,430
SU06F	C01	.31	552.0	60	FLDCT			6	286	2,324
SUOGF	C01	32	276.0	60	FLDBK	B0012	22272	7	286	2,822
SUOSF	C01	33	2,756.0	600	PTBBK	B0012	77777	3	286	-108
77777	ZZZZZ	34	4,396.0	-0-0-		80012	22222	4	288	-110
77777	77777	35	2,808.0	600	PTSC1	B0012	ZZZZZ	5	0	46,643
T.L.	LLL	33	2,000.0	600	PTEBK	B0012	ZZZZZ	6	Ò	2,977

 Beta Flag
 45000 - \_\_\_\_

 Beta Max Flag
 60000 \_\_\_\_\_

Wednesday, October 28, 2009

Page 2 of 2

```
28 Oct 2009 09:30
                                     ALPHA/BETA - 1.09
                                                                                                   Page #1
Protocol #:25
                                     Smears H-3 & C-14
                                                                                User : EaglePicher / ES
Time: 1.00
                                                                                       54006
Data Mode: Dual DPM
                      Nuclides: 3H-14D
                                               Quench Sets
                                                  Low Energy: 3H
Background Subtract: 1st Vial
                                                  High Energy: 140
           EL OL
                     LCR
                           25%
                                   BKG
         0.0 - 12.0
                      0 0.0
Region A:
                                   9.31
Region B: 12.0 - 156
                     0 0.0
                                 17.39
Region C: 0.0 - 0.0
                      0 0.0
                                  0.00
Quench Indicator: tSIE/AEC
  Ext Std Terminator: Count
FSS Smears in 20 ml Ultima Gold
Coincidence Time(ns): 18
Delay Before Burstins): Normal
Protocol Data Filename: C:\EP\PROT.DAT
Count Data Filename: C:\EP\SDATA25.001
 P#PID S# SMPL_ID TIME
                                     CPMAA:28% CPMBB:25%
                                                                           DPM1 DPM2 tSIE FLAG
 25 2 1
                             10.0
                                        9.3 20.7
                                                         17.4 15.2
                                                                                               416
                           2.7 268 14.6 79.5
      2MEZ CETL 5U06-1
                                               1.96 17.71 463
25 2 3MEZ CEIL SU06-2 1.0 9.9 90.8
                                     8,4 [25
                                              25.00
                                                     8,92 45
25 2 4MEZ CEIL 5U06-3 1.0 15.4 65.9 29.9 46.8 33.33 34.77 434
25 2 5MEZ CEIL SU06-4 1.0
                           8.6 101
                                    0.7 1360
                                               24.89
                                                      0.00 447
15 7 SMEZ SEIL SU06-5 1.0 19.8 55.4 105.5 21.2
                                              15.56 127.93 453
25 2 7MEZ CETL SU06-6 1.0 5.1 154 21.2 59.9
                                               6.17
                                                     25.52 467
13 2 BMEZ GEIL 8006-7
25 2 9MEZ GEIL 8006-8
                           4.7 166
                     1.0
                                     0.0 0.0
                                              13.31
                                                      0.00 448
                           2.7 769
                                     5.6 177
                                               5.39
                                                      6,57 467
   I 10MEZ CEIL 5U06-9 1.0
                                     6.5 161
                                               20.34
                           8.0 106
                                                      6.54 464
25 2 11MEZ CEIL SU06-10 1.0
                           8.8 99.2
                                     15.5 75.9
                                               19,25
                                                      17,87 450
15 2 12MEZ GETL SUGA-11
                            8.1 106
                                     7.2 142
                                                       7.73 466
                      1.0
                                               20.03
25 7 13MEZ CETL SU06-12
                      1.0
                            7.7 110
                                      0.0 0.0
                                               22.05
                                                      0.00 45-
15 7 14MEZ CEIL 5006-13 1.0
                           1.4 476
                                      9.9 109
                                               0.25
                                                      12.01 466
25 7 15MEZ CETL SU06-14 1.0
                           9.1 96.7 13.2 86.1
                                               20,58
                                                      14.98 467
   7 15MEZ CETL SU05-18 1.0
                                                7.46
                            1.9 372
                                      7.4 139
                                                      8,93 457
25 7 17MEZ CEIL SU06-16
                      1.0
                           20.8 53.5
                                      37.5 30.3
                                               37,54
                                                      68,10 450
75 7 (BMEZ CETL SU06-17
                           10.7 85.6
                      1.0
                                     20.6 61.2
                                               22.45
                                                      23,92 460
25 7 19MEZ CEIL SU06-18
                      1.0 13.9 70.6
                                     15.4 76.4
                                               33.78
                                                      16,91 460
15 7 30MEZ CETL SUGA-19
                      1.0
                            9,7 92,2
                                      6.6 153
                                               25,11
                                                      6.71 458
25 7 21MEZ CEIL 5U08-20
                           5.8 138
                                     11.1 98.8
                      1.0
                                               12.38
                                                      12,92 455
15 7 22MEZ CETL 5U06-21
                      1.0
                           8.7 99.6
                                     21,6 39.2
                                               16.79
                                                      25.39 451
25 7 23MEZ CEIL SU06-22 1.0 4.7 165
                                     0.0 0.0
                                               13.19
                                                      0,00 460
   7 34MEZ CEIL 8U06-23
                      1.0
                            9.8 91.4
                                     14.5 80.0
                                               22,53
                                                      16.47 454
                            6.7 123
25 3 25MEZ CEIL SU06-24
                                      3.6 264
                      1.0
                                               17.82
                                                      3.44 454
                            6.7 123
                      1.0
25 J PAMEZ CEIL SU06-25
                                      3.4 264
                                               17.45
                                                      3,46 468
25 3 27ME7 CEIL 8U06+26
                                     13.3 84.4
                            6.8 122
                                               14,19
                                                      15,76 451
                      1.0
15 3 28MEZ SEIL 5U06-27
                      1.0
                            1.7 410
                                      3.6 264
                                                3.37
                                                       4.22 467
25 3 29ME7 CEIL SU06-28 1.0 1.7 415
                                     0.0 0.0
                                               4.67
                                                      0.00 47.
IS 3 DOMEX CEIL SU06-29 1.0 1.9 373
                                      5.4 277
                                                      3,97 457
                                               4,01
25 3 31MEZ CEIL $806-30 1.0
                           4.0 191
                                      5.3 185
                                               9,19
                                                      5,02 461
                                                     DPA2
```

# 4.3.7 SU007-Out Building

This was a Class 3 survey unit.

Summary results are provided in Table 4-8 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

**Table 4-8: SU007 Summary Results** 

Summary Survey Unit 007 Out Building, Class 3	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums* (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm²)
Number	34	2	34	34
Average	1,548	5,173	8.5	5.9
Standard Deviation	940	N/A	12.3	10.0
Maximum	4,658	5,687	61.5	49.4

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



### FSS Survey Package Worksheet for EaglePicher SU007

Package Identification No.: SU07F/SU07S	Prepared by: Paul C. Ely
Location: Out Buildings	Date Prepared: 9/30/2009
Area Classification: Class 3	Signature: Paul Ele

#### Area Description

The survey area includes the floors, walls and ceilings. There are two Out Buildings, the former Solvent Storage Building and the former Mixed Waste Storage Shed.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3. Both the former Solvent Storage Building and the former Mixed Waste Storage Shed are empty and do not contain residual hazardous material.

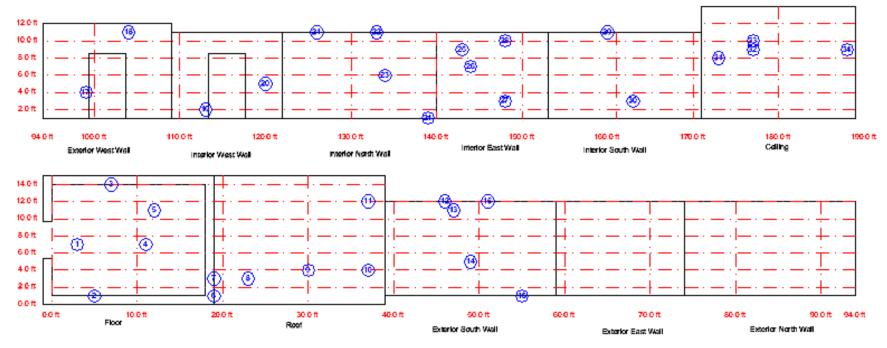
# **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - $\varepsilon_t$ , the total beta efficiency =  $\varepsilon_i * \varepsilon_s$
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 25% scan of floor and lower walls (6-feet and below), for beta contamination and 10% scan of upper walls and ceiling for beta contamination.
- Perform direct beta surface activity measurements at each measurement location. All surveys locations are
  referenced from the southwest corner of the survey unit. Random survey locations were generated for this class 3
  survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm² in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Survey Package Worksheet SU07F/SU07S (cont'd)

Source check instrumentation to C-14 for beta measurements.  The static MDC for total beta activity measurements shall be less than 3,000 dpm/100 cm².  Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in cpm on a Grid Scan Record.  Survey Performance (Initial a Location Codes	umentatic or total bel 1. m of three ne survey; ments or r un Record.	on to C-14 for beta measurements.  ta activity measurements shall be surface.  record maximum scan measurement.  Survey Performanc  General Beta Survey Directormanc  Ceneral Scan Tech Beta	r beta m asurem ffeld ba um scal	surements shall be less than field backgrounds using the scan measurement results in scan measurement results in Beta Survey Performance (Initial and date as each item is completed)  Beta Survey Beta Tech Alpha Tech Scan Tech Tech	be less la using the sament resument recommend to the less la using the lance (In lance (In lance la lance (In lance la lance la lance (In lance la la lance la la lance la la	han he sults in itial and	o R in	Randomly generated the attached survey of measurement location location on the map.  as each item is com	generate start locat locat locat locat in the main	ed measu y map. If tion to the p.	rement ar f any local e nearest i	nd sampling tion is inac usable loca	Randomly generated measurement and sampling locations are indicated on the attached survey map. If any location is inaccessible, offset the measurement location to the nearest usable location and mark the survey location on the map.	indicated o the the survey
Location Codes			Survey Beta Scan	Perform Survey Tech	ance (I	nitial and	d date a: Direct	s each ite		mpleted				
Location Codes						-	Direct	Survey	em is con					
					-		Direct	Survey					Smoon	
LI L2					_	Survey Tech	mide.	Tech	Alpha Scan	Survey Tech	Direct Gamma	Survey Tech	Gross (Liq. Scint.)	Survey Tech
					EaglePi	cher SU	007 Clas	EaglePicher SU007 Class 3 Area						
Package Surface N ID or Structure	Material Code			Initial & Date	@60 sec	Initial & Date	3ec	Initial & Date		Initial & Date	@100 cm	Initial & Date	β	Initial & Date
SU7SF S0001	6666B	Solvent	N/A	N/A	34	2.7.09	N/A	N/A	N/A	N/A	N/A	N/A	34	57
SU7SS S0002	B9999	Solvent	10%-	60-4-11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SUTWF S0002	B9999	Mixed	N/A	N/A	3,0		NIVA	A1/A	****	*****				
		p			03	7		N.W.	N/A	N/A	N/A	NA	26	P017169
SU07WS S0002	6666B	Waste Bld	10%-	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			İ	t	T	T	1	1	1	T				

I protion Order			Surve	y Perfor	mance (	Survey Performance (Initial and date as each item is completed)	d date a	s each it	em is co	mpleted				
-	97	General Description	Beta	Survey Tech	Direct Beta	Survey Tech	Direct Alpha	Survey Tech	Alpha Scan	Survey Tech	Direct	Survey Tech	Smear Gross (Liq. Scint.)	Survey Tech
									- 4 - 3					
						Survey Comments	Соштеп	ts						
		Pecformed See atta	attached	survey hed f	L L	fixeB	lven B 00.	solvent storage	cadi	100	S. S		145	
The mixed we and shald n	hast have	waste building not have been		was ren included	sed ;	removed during	s se	Survey		s.te	clean-up PCE	18	phes +	
				1		Package	Package Review							
Surveyor(s) Signatures: Date Package Completed:	X	1-8-09	1	Much.	St.									
Package Review by and Date (Signature):	Date (5	signature):	H	20	3	on	13/9	1/2009	60					
Rev. 0					7									



Solvent Storage Building SU-007

Figure 4-8 SU007 Survey Map

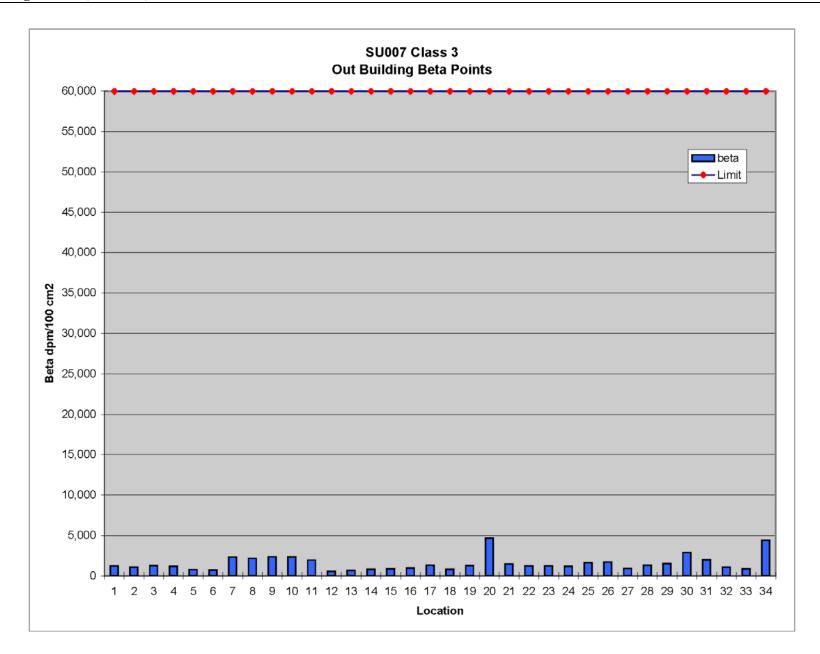
EaglePicher FSS Data Sheet Survey Unit 007 Out Building

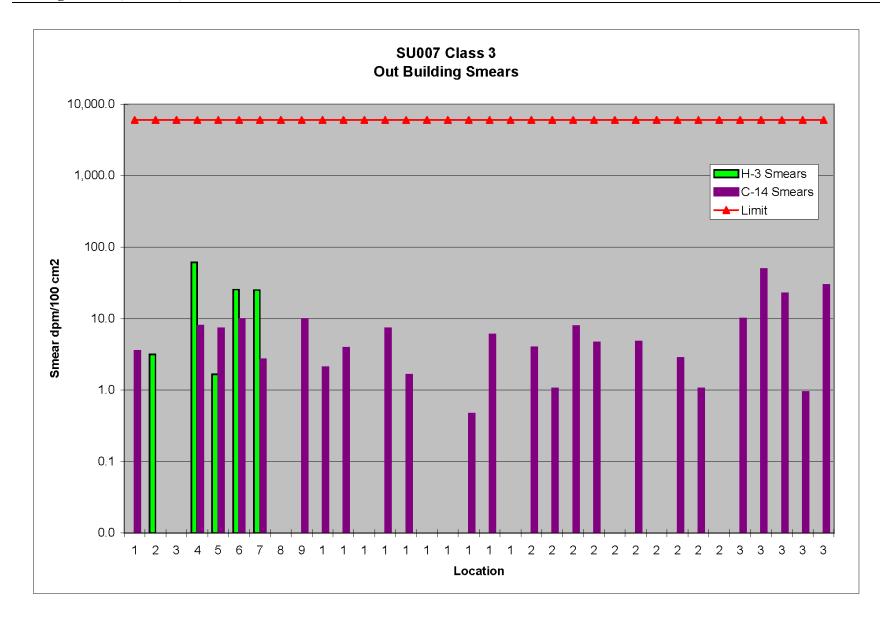
 Detector Type
 Detector SN
 (cm²)
 Due
 Meter Type
 Meter SN
 Meter Cal Due

 Ludlum 43-68 (beta)
 91028
 126
 9/28/10
 2350-1
 117566
 9/28/10

 Packard Tri-Carb B2555
 401663
 NA
 Daily
 NA
 NA
 NA

			В	eta	H-S	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )				
1	F	Floor	1,220	60,000	0.0	6,000	3.6
2	F	Floor	1,072	60,000	0.0	6,000	0.0
3	F	Floor	1,263	60,000	13.5	6,000	0.0
4	F	Floor	1,167	60,000	0.0	6,000	8.0
5	F	Floor	785	60,000	0.0	6,000	7.3
6	R	Roof	711	60,000	0.0	6,000	9.9
7	R	Roof	2,313	60,000	14.5	6,000	2.7
8	R	Roof	2,165	60,000	0.1	6,000	0.0
9	R	Roof	2,355	60,000	0.0	6,000	9.9
10	R	Roof	2,324	60,000	21.4	6,000	2.1
11	R	Roof	1,952	60,000	6.0	6,000	3.9
12	W	Wall	573	60,000	6.1	6,000	0.0
13	W	Wall	668	60,000	5.4	6,000	7.3
14	W	Wall	806	60,000	11.4	6,000	1.7
15	W	Wall	881	60,000	0.0	6,000	0.0
16	W	Wall	966	60,000	0.0	6,000	0.0
17	W	Wall	1,337	60,000	19.3	6,000	0.5
18	W	Wall	828	60,000	0.0	6,000	6.0
19	W	Wall	1,263	60,000	10.4	6,000	0.0
20	W	Wall	4,658	60,000	13.6	6,000	4.0
21	W	Wall	1,464	60,000	0.0	6,000	1.1
22	W	Wall	1,210	60,000	9.4	6,000	7.9
23	W	Wall	1,231	60,000	1.6	6,000	4.6
24	W	Wall	1,167	60,000	13.3	6,000	0.0
25	W	Wall	1,623	60,000	0.0	6,000	4.8
26	W	Wall	1,708	60,000	10.7	6,000	0.0
27	W	Wall	902	60,000	13.9	6,000	2.8
28	W	Wall	1,326	60,000	0.0	6,000	1.1
29	W	Wall	1,528	60,000	3.2	6,000	0.0
30	W	Wall	2,865	60,000	0.0	6,000	10.0
31	С	Ceiling	1,963	60,000	61.5	6,000	49.4
32	С	Ceiling	1,061	60,000	1.7	6,000	22.5
33	С	Ceiling	881	60,000	25.5	6,000	0.9
34	С	Ceiling	4,393	60,000	25.1	6,000	29.7
Average		_	1,548		8.5		5.9
Standard Deviation			940		12.3		10.0
Maximum			4,658		61.5		49.4
* R = Roof, F = Floor, W:	= Wall, C = Cei	iling, E = Equip	ment				-







M2350-1 Download BETA Report

	ription :SU7SF Points 1-34	
Survey Reason : Final Status		
User ID RLS2098	Technician Name : Lee Severtso	n
Instrument Model : 2350-1	Instrument S/N : 117566	Instrument Cal. Due : 9/28/2010
Detector Model 43-68b	Detector S/N: 091028	Detector Cal. Due : 9/28/2010
Measurement Type : BETA	Detector Type: 02200 ; 126 cm2	Gas Proportional Detector
Detector Area : 126	Efficiency: 0.0748	Survey Date : 11/5/2009
Minimum Net DPM Observed: -1532	Mean Net DPM: 3227	
Maximum Net DPM Observed: 41423	STDEV Observed: 8709	# of Samples Taken: 40

Print Name

Print Name

Richard P. Stoney Rehability

Signature

11-5-09

Date

11-05-09

Date

Date

Comments:	Ve Scan re valent to cpm, 536c) 2 = 5,687 d	salings for	100cm2, 100	000 cpm.	This m/backeroun
= 576	Pm. 5360	Pm - 0.0748 c	pm/dpm (EA)	iemay) + 126 a	un d
10020	- 5,6810	payloo cur,	Try		

Sign-Off PAULELY Paul Ely 12/9/09
Print Name Signature 12/9/09
Page 1 of 3

# Duratek Beta Survey Report

Download File Name: 00000049

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU7SF	S0001	0	3,196.0	600	PRBBK	B9999	22272	0	464	-1,532
SU7SF	S0001	1	4,166.0	60	PRSC1	B9999	ZZZZZ	0	464	39,279
SU7SF	\$0001	2	579.0	60	FLDCT	B9999	22222	1	464	1,220
SU7SF	S0001	3	565,0	60	FLDCT	B9999	27772	2	464	1,072
SU7SF	S0001	4	583.0	60	FLDCT	B9999	77777	3	464	1,263
SU7SF	S0001	5	574.0	60	FLDCT	B9999	22272	4	464	1,167
SU7SF	S0001	6	538.0	60	FLDBK	B9999	27777	5	464	785
SU7SF	S0001	7	531.0	60	FLDCT	B9999	27777	6	464	711
SU7SF	S0001	6	583.0	80	FLDCT	B9999	27277	19	464	1,263
SU7SF	S0001	9	903.0	60	FLDCT	B9999	ZZZZZ	20	464	4,658
SU7SF	50001	10	602.0	60	FLOCT	B9999	27227	21	464	1,464
SU7SF	\$0001	11	578.0	60	FLDCT	B9999	77777	22	464	1,210
SU7SF	50001	12	580.0	60	FLDCT	89999	22222	23	464	1,210
SU7SF	S0001	13	574.0	60	FLDCT	B9999	77777	24	464	
SU7SF	S0001	14	617.0	60	FLOCT	B9999	22222	25	464	1,167
SU7SF	50001	15	625.0	60	FLDCT	B9999	22222	26	464	1,623
SU7SF	\$0001	16	549.0	60	FLDCT	B9999	77777	27	464	1,708
SU7SF	S0001	17	589.0	60	FLDCT	B9999	27222	28		902
SU7SF	S0001	18	608.0	60	FLDCT	89999	77777	29	454	1,326
SU7SF	S0001	19	734.0	60	FLDCT	B9999	27277	30	464	1,528
SU7SF	S0001	20	399.0	60	FLDBK	89999	77777		464	2,865
SU7SF	50001	21	649.0	60	FLOCT	B9999	22222	30	464	-690
SU7SF	S0001	22	584.0	60	FLDCT	89999	ZZZZZ	31	464	1,963
SU7SF	S0001	23	547.0	60	FLDCT	B9999	77777	32	484	1,061
SU7SF	S0001	24	678.0	60	FLDCT	B9999	ZZZZZ	33	464	881
SU7SF	S0001	25	590.0	80	FLDCT	B9999	22222	34	464	4,393
SU7SF	S0001	26	542.0	60	FLDCT			17	464	1,337
SU7SF	S0001	27	518.0	60	FLDCT	89999	27272	18	464	828
SU7SF	S0001	28	527.0	60	FLDCT	B9999	22222	12	464	573
SU7SF	S0001	29	540.0	60	FLDCT	B9999	ZZZZZ	13	464	668
SU7SF	S0001	30	547.0	60	FLOCT	B9999	ZZZZZ	14	464	806
SU7SF	S0001	31	555.0	60		B9999	77777	15	464	881
SU7SF	50001	32	582.0	60	FLDCT	B9999	ZZZZZ	16	464	966
SU7SF	S0001	33	668.0	60	FLOCT	B9999	ZZZZZ	7	464	2,313
SU7SF	S0001	34	686.0		FLDCT	B9999	22222	8	464	2,165
SU7SF	S0001	35	683.0	60	FLOCT	89999	22722	9	191	2,355
SU7SF					FLOCT	B9999	ZZZZZ	10	464	2,324
SU7SF	S0001	36	648.0	60	FLDCT	B9999	ZZZZZ	11	464	1,952
	S0001	37	406.0	60	FLDBK	B9999	27272	11	464	-615
SU7SF	S0001	38	3,323.0	600	PTBBK	B9999	77272	4	464	-1,397
			Beta Flag			45000 -		1		
			Beta Max			60000				

Thursday, November 05, 2009

Page 2 of 3

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)		Net (DPM/100cm2)
SU7SF	S0001	39	4,368.0	60	PTSC1	B9999	77777	1	464	41,423

04 Nov 2009 Protocol #: 2			/BETA - 1.09 5 H-3 & C-14		User :		age #1 cher / E	_ S
Time: 1.00 Data Mode: Du		112 - 3	Nuclides:	3H-14C	Quenci	h Sets w Energy	: 3H	
Background Su	iDtract: 15t	VIGI			HIG	gh Energ	v: 14C	
Region A: Region B: 1 Region C:	0.0 - 12.0 2.0 - 156 0.0 - 0.0	LCR 0 0 0	0.0 15	BKG .95 .15				
Quench Indica Ext Std Te FSS Smears in Coincidence T Delay Before Protocol Data Count Data Fi	rminator: Co 20 ml Ultim ime(ns): 18 Burst(ns): N Filename: C	unt a Gold ormal :\EP\PF						
P#PID S# 2 1 1 2 1 3 2 1 4 2 1 5 2 1 7 2 1 8 2 1 7 2 1 1 8 2 1 1 7 2 1 1 10 2 1 1 11 2 1 12 2 9 14 2 9 15 2 9 14 2 9 15 2 9 19 2 9 20 2 9 21 2 9 22 2 9 23 2 10 33 2 10 33 2 10 35	SMPL_ID  SU007-1 SU007-2 SU007-3 SU007-4 SU007-5 SU007-6 SU007-7 SU007-8 SU007-10 SU007-11 SU007-12 SU007-13 SU007-14 SU007-15 SU007-15 SU007-16 SU007-17 SU007-17 SU007-18 SU007-17 SU007-20 SU007-21 SU007-21 SU007-22 SU007-23 SU007-24 SU007-25 SU007-27 SU007-27 SU007-28 SU007-29 SU007-31 SU007-31 SU007-32 SU007-33 SU007-34	TIME 10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.	CPMAA:25% 10.0 20.0 0.0 **** 0.0 0.0 4.0 191 0.0 0.0 0.0 **** 5.0 158 0.0 **** 3.4 223 5.0 158 0.0 0.0 4.0 191 1.0 662 0.0 0.0 24.1 49.1 3.0 246 8.0 108 11.5 82.2	CPMBB:25% 15.1 16.3 2.9 310 0.0 0.0 0.0 0.0 6.4 151 5.8 163 7.9 126 2.9 310 0.0 0.0 7.9 126 2.7 331 3.5 259 0.0 0.0 6.2 153 1.9 465 0.0 0.0 6.2 153 1.9 465 0.0 0.0 3.9 235 0.0 0.0 3.9 235 0.9 981 6.9 142 3.9 235 0.0 0.0 3.9 235 0.0 0.0 2.9 303 0.9 981 0.0 0.0 2.9 303 0.9 981 0.0 0.0 8.0 124 42.8 36.1 18.5 64.2 1.9 464 25.4 51.1	3H-DPM 0.00 0.00 0.00 13.49 0.00 0.00 14.48 0.14 0.00 21.39 5.98 6.11 5.40 11.42 0.00 0.00 19.33 0.00 10.39 13.57 0.00 9.42 1.57 13.34 0.00 10.67 13.85 0.00 3.17 0.00 61.45 1.66 25.49 25.05	0.00 3.57 0.00 0.00 8.01 7.33 9.85 2.72 0.00 7.91 2.10 3.92 0.00 7.34 1.65 0.00 0.47 6.04 0.00 3.98 1.06 7.87 4.63 0.00	tSIE FLA 399 385 3884 3879 359 379 412 417 360 429 431 425 427 421 425 427 428 428 382 427 428 382 427 428 382 427 421 382 420 421 382 421 382 421	AG B

# 4.3.8 SU008-Paved Areas

This was a Class 3 survey unit.

Summary results are provided in Table 4-9 which is followed by the survey package, a survey map, a survey data sheet, a chart presenting the survey data, and the Survey Form.

**Table 4-9: SU008 Summary Results** 

Summary Survey Unit 008	Gamma
Paved Areas, Class 3	(µR/hr)
Number	16
Average	7.3
Standard Deviation	0.6
Maximum	8.5



# FSS Survey Package Worksheet for EaglePicher SU008

Package Identification No.: SU08F/SU08S	Prepared by: Paul C. Ely
Location: Site Paved Areas & Sidewalks	Date Prepared: 12/22/2009
Area Classification: Class 3	Signature: Paul Eleg

#### **Area Description**

The survey area includes the site paved areas and sidewalks.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

# **General Survey Instructions**

- 1. Use a 2" by 2" Nal detector, Ludlum model number 44-10, or equivalent as approved by the ES PM for exposure rate surveys. Obtain surface scan exposure rate data, at about 6-in above the soil surface, over 100% of the soil where buildings were removed and 10% for the rest of the site. The detector should be moved back and forth in a serpentine motion, while walking over the surface at a speed not to exceed approximately 0.25 meters per second. Scans will be logged but the logged data is for information only. Identify any elevated areas of measurement and record the maximum reading obtained.
- Obtain and record a dose rate measurement at each location indicated on the attached survey map at about 6-in above the soil surface.

Page 1 of 2

Survey Package Worksheet SU08F/SU08S (cont'd)

For gamma measurements.  Survey Performance (Initial and date as each item is completed)  Survey Performance (Initial and date as each item is completed)  Survey Performance (Initial and date as each item is completed)  Survey Direct Survey Direct Survey Alpha Survey Direct Gamma Tech (I.iq. Scint.)  EaglePicher SU/008 Class 3 Area    Initial & @ 60	rce check instrumentation ord measurement results no. ocation Codes  Surface Material or Code Structure  A0001 B9999 F	Cs-137 for ge pm on a Radi											
Survey Performance (Initial and date as each item is completed)  Beta Survey Direct Survey Direct Survey Alpha Survey Gamma Tech Gamma Tech (Liq. Scint.)  EaglePicher SU008 Class 3 Area  Initial @60 Initial & & & & & & & & & & & & & & & & & & &	Surface Material or Structure A0001 B9999 Pa		amma me	asuremen ection Si	nts. 11vey	•	The attach	led map	provides	neasuren	nent and san	npling location	ls.
Beta Survey Direct Survey Direct Survey Alpha Survey Direct Survey Gross Scan Tech Alpha Tech Gamma Tech Gamma Tech Gamma Tech Gross Survey Gross Scan Tech Alpha Survey Gross Scan Tech Gamma Tech Gamma Tech Gross Survey Gross Sarea EaglePicher SU008 Class 3 Area Region Initial & & & & & & & & & & & & & & & & & & &	Surface Material or Code Structure A0001 B9999 Pa	Surv	ey Perfor	rmance	Initial a	nd date a	is each ite	em is co	mpleted)				
EaglePicher SU008 Class 3 Area   Icol	Surface Material or Code Structure A0001 B9999 Pa				Survey			-		Direct	Survey	Smear	Survey
Initial	Surface Material or Code Structure A0001 B9999 Pa	=			Picher S	U008 Cla	ss 3 Ares	Scan		Gamma	Tech	(Liq. Scint.)	Tech
NIA NIA NIA NIA NIA NIA 16 X NIA  Survey Comments  Survey Comments  Package Review  Package Review  Apply EP-09-390  Package Review  Apply EP-09-390  Package Review  Apply EP-09-390  Package Review  Package Review  Package Review  Package Review	A0001 B9999 Pa		Initial & Date	@ 60 sec	Initial & Date	@60 sec	Initial & Date		Initial &	@100 cm	Initial & Date	8	Initial & Date
Survey Comments  8 y Form, Log# EP-09-290 PCE 12/22/09  Package Review  Package Review  12/22/09  Package Review  12/22/09  Package Review  12/22/09	See Hached	$\vdash$	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16	*	N/A	N/A
Packed Survey Form, Hog# EP-09-290 PE 12/22/09	See Mached				Survey	Соштеп	T SI						
Melled Survey Form, hogh EP-9-390 RE		arvey	Form	-	# # bo	FP-04	1-29	0	3	12/2	50%		
Mached Survey Form, Hog # EP-81-890 RE													
4 See attached Survey Form, hog # Ep. 9-390 RE d: 12/5/09 Date (Signature): For Pr. P. 89 12/22/09					Packag	ge Review	5						
Paig 58 121	* ;		ng pa		Form		9# E	10-0d	-2990	d	1	122/69	
	kage Review by and Date (Signa	ature):	And	3	Da		12/2	2109					

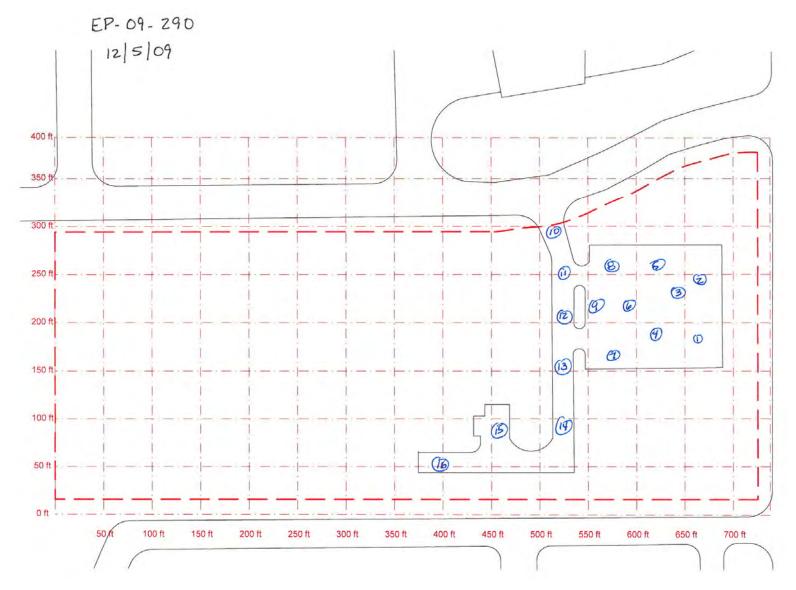


Figure 4-9 SU008 Survey Map

EaglePicher FSS Data Sheet Survey Unit 008 Pavement

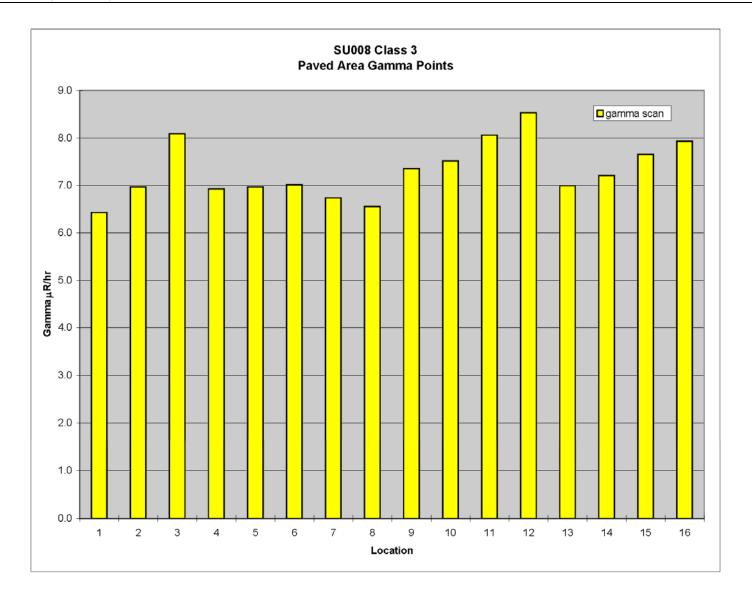
Detector Type Ludlum 44-10 (gamma)	Detector SN 192598	Detector Cal Due 12/4/09
G	amma Scan	
Survey		
Point	cpm	(μR/hr)
1	6,050	6.4
2	6,560	7.0
3	7,620	8.1
4	6,520	6.9
5	6,560	7.0
6	6,600	7.0
7	6,340	6.7
8	6,170	6.6
9	6,920	7.4
10	7,070	7.5
11	7,590	8.1
12	8,030	8.5
13	6,580	7.0
14	6,780	7.2
15	7,210	7.7
16	7,470	7.9
Average	6,879	7.3
Standard Deviation	570	0.6
Maximum	8,030	8.5

Meter SN Meter Cal Due 126183 12/4/09 Calibration

Calibration Constant (Counts/R) 5.649E+10

Meter Type

2350-1



## RADIATION PROTECTION SURVEY FORM

	D: Eagle Pick	WHITE STATE OF THE PARTY OF THE			Survey	Log #: EP	09 - 290
Tech (pri	nt): J. Davis	2	Location: EPPS	PARKING LOT	RHWP #	t: N/A	
	estrument(s) L		Purpose of Sur	vey	Date: 12		
Model	S/N	Cal. Due	GAMMA	WALKCYER		1020	
2350-1	126183	12/4/09			Sample #:	N/A	
44-10	192598	12/4/09	l'	4	Sample #:		
				^	Air Sample	e#: 14/a	
<u> </u>	N				A/S Result	ts (DAC): N	
	A		All dose rates in ul	R/hr unless noted.	Smear #		(dpm/100 cm <sup>2</sup> )
	I				1	alpha	beta
	C	. /.1	OVER DA	π Δ	2		/
					3		
		(Kcpm	)		4		/
					5		<del>/</del>
17 6	05		9) 6.92		6		/
2) 6	.56		7.07		7		/
3) 7.			11) 7.59		8		/
			,		9	M	/
4) 6.	52	1	2) 8.03		10	14/	A
5) 6	.56	1	3) 6.58		11	/	
			47 6.78		12		
6) 6	.60				13		
7) 6	.34		5) 7.21		14		
· · ·		1	6) 7.47		15		
8) 6	17	'	9) 1.41		16		
					18		
* SEE	ATTACHE	D MAO	FOR CORRES	2017111	19	1	
				ER SURVEY,	20		
200	ATTONS PO	JE GAMM	TA WAUC-W	er survey,	LAW - Larg		
COMMENT	S:				Area Wipe	xx - RCA ear H - Head	Boundary
					- Tritium	F - Foot I	
					Smear	K = 1000	1
					∆ - Air Sam # - Direct fr	ipie isk	
Performed	By / Date:			Reviewed by / Date			
		1		/ \ ///		, ,	
( control	R. DAVIS	/ 12-5-	09	( God		12/5/20	15

Page 1of 2

## 4.3.9 SU009-Soil Areas

This was a Class 3 survey unit.

Summary results are provided in Table 4-10 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the laboratory analytical results. The laboratory analytical reports are provided in Attachment 7.6.

**Table 4-10: SU009 Summary Results** 

Summary Survey Unit 009 Soil Areas, Class 3	Gamma Points (μR/hr)	H-3 in Soil (pCi/g)	C-14 in Soil (pCi/g)
Number	31	34	34
Average	10.5	1.39	2.63
Standard Deviation	0.7	3.74	2.94
Maximum	11.9	15.10	13.60



## FSS Survey Package Worksheet for EaglePicher SU009

Package Identification No.: SU009	Prepared by: Paul C. Ely
Location: Site Soil Areas	Date Prepared: 9/30/2009
Area Classification: Class 3	Signature: Face Ely

#### Area Description

The survey area includes the site soil areas including areas where structures have been removed.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

#### **General Survey Instructions**

- 1. Perform soil surveys and sampling according to procedure CS-FO-PR-003 and this instruction.
- 2. Use a 2" by 2" NaI detector, Ludlum model number 44-10, or equivalent as approved by the ES PM for exposure rate soil surveys. Obtain surface scan exposure rate data, at about 6-in above the soil surface, over 100% of the soil where buildings were removed and 10% for the rest of the site. The detector should be moved back and forth in a serpentine motion, while walking over the surface at a speed not to exceed approximately 0.25 meters per second. Scans will be logged but the logged data is for information only. Identify any elevated areas of measurement and record the maximum reading obtained.
- Sample locations are indicated on the attached figure. Using a tape measure locate each sample to be taken and mark the location with a surveyors wire flag and mark the sample location number on the flag.
- 4. Obtain and record a dose rate measurement at each sample location at about 6-in above the soil surface.
- Using hand tools, obtain a ~ 1,000 ml surface sample (~0 to 6-in deep) from the sample location. Place the sample into a gallon size large Ziploc® type bag and label the container with the sample information. Record the sample information on Field Sample Data Sheets (attached).
- Every 10<sup>th</sup> sample will have twice as much material collected split in half. Both halves will be sent offsite for analysis. A Chain-Of-Custody form (attached) will be completed for each sample sent offsite.
- After each use, thoroughly clean all parts of the soil sampling tool. Cleaning is accomplished with a nylon brush, clean water and phosphate-free soap. Then rinse with clean water.

Survey Package Worksheet SU009 (cont'd)

Special Instructions

Notify the ES Project Manager of locations that exceed measured activity

50% greater than the average activity.

Record maximum scan measurement results, in cpm, for each scan area. Random measurement and sampling locations were generated for this Class 3 survey package.

Source check instrumentation to Cs-137 for gamma measurements.

Attach photographic records if available and provide descriptive comments for each image under Survey Comments.

The attached map provides measurement and sampling locations.

Survey Direct Survey Soil Tech Gamma Tech Samples
Gamma Tech
Initial @100 Initial & Date cm
Severtsen 30 Leertsen 30
12/9/09 AShaven

Toronto I		Surv	ey Perfor	mance	Initial a	nd date	as each i	Survey Performance (Initial and date as each item is completed)	mpleted)				
Location Codes	General Description	Beta	Survey Tech	Direct Beta	Survey	Direct Alpha	Survey Tech	Gamma	Survey	Direct Gamma	Survey	Soil	Survey
					Survey	Survey Comments	nts						
					Packag	Package Review	*						
Surveyor(s) Signatures: L Date Package Completed:	4-	Severtson	10	Sheron	Mcc	McChowy	fa	310	PO18/21 300	60/6			
Package Review by and Date (Signature):	te (Signature)	4	400		re		12/2	123/09					
Rev. 0					B								
													Page 3 of 3



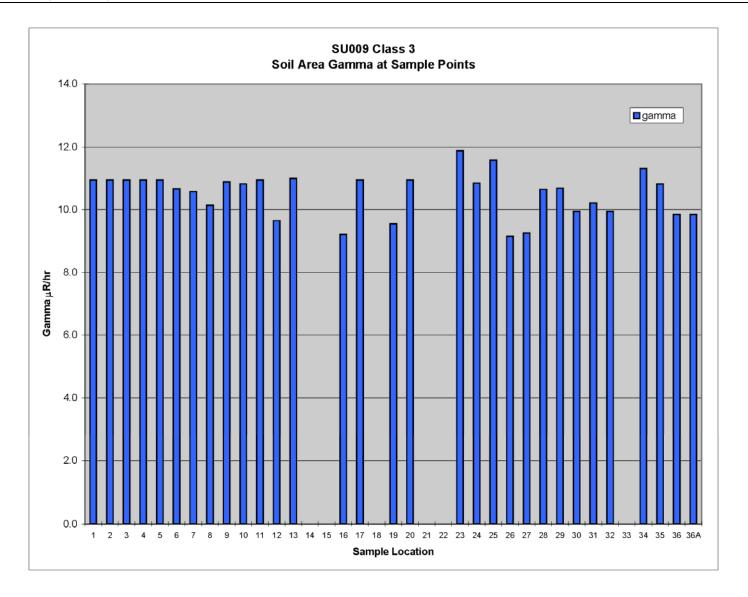
Figure 4-10 SU009 Survey Map

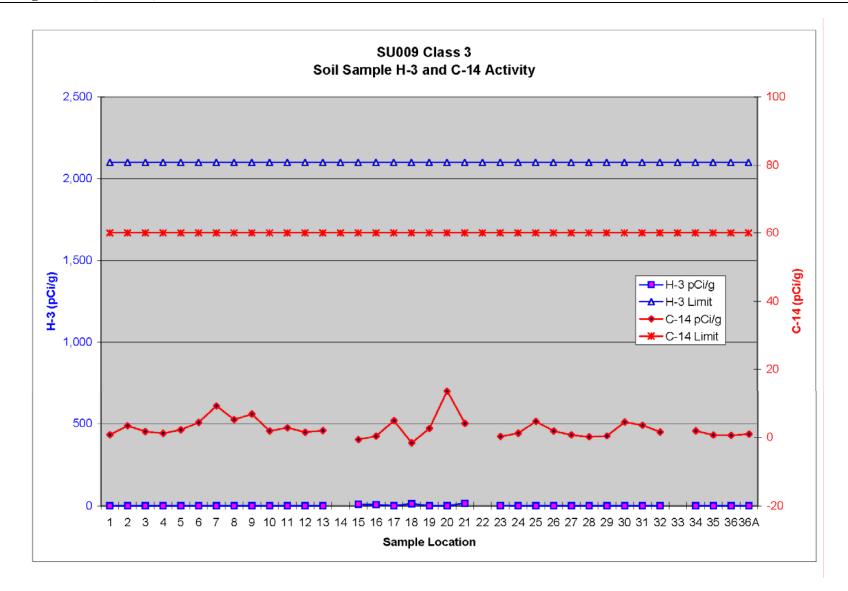
Samples not taken at locations 14, 22 and 33 as these locations were in the road or in the parking lot.

EaglePicher FSS Data Sheet Survey Unit 009 Soil Areas

							Calibration
		Detector	Detector Cal				Constant
Detector Type	Detector SN	(cm²)	Due	Meter Type	Meter SN	Meter Cal Due	(Counts/R)
Ludlum 44-10 (gamma)	157372	2x2 Nal	4/21/10	2350-1	117573	4/18/10	5.904E+10
Ludium 44-10 (gamma)	227358	2x2 Nal	5/18/10	2350-1	117555	4/21/10	6.033E+10

		Gamma	Gamma	H-	3	c-	14
Survey		Fixed Reading	Fixed Reading	Sample	Limit	Sample	Limit
Point	Loc.*	(cpm)	(μR/hr)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
1	Soil	11,000	10.9	0.230	2,100	0.770	60
2	Soil	11,000	10.9	-0.030	2,100	3.360	60
3	Soil	11,000	10.9	0.030	2,100	1.700	60
4	Soil	11,000	10.9	0.110	2,100	1.180	60
5	Soil	11,000	10.9	0.150	2,100	2.200	60
6	Soil	10,490	10.7	0.040	2,100	4.370	60
7	Soil	10,399	10.6	-0.001	2,100	9.200	60
8	Soil	9,973	10.1	-0.210	2,100	5.200	60
9	Soil	10,702	10.9	-0.130	2,100	6.800	60
10	Soil	10,641	10.8	0.020	2,100	1.860	60
11	Soil	11,000	10.9	-0.090	2,100	2.790	60
12	Soil	9,700	9.6	-0.110	2,100	1.520	60
13	Soil	10,808	11.0	-0.050	2,100	1.990	60
14	Soil	N/A	N/A		2,100		60
15	Soil	NT	NT	9.510	2,100	-0.638	60
16	Soil	9,062	9.2	6.210	2,100	0.380	60
17	Soil	11,000	10.9	0.020	2,100	4.870	60
18	Soil	NT	NT	12.900	2,100	-1.620	60
19	Soil	9,600	9.5	-0.050	2,100	2.610	60
20	Soil	11,000	10.9	0.170	2,100	13.600	60
21	Soil	NT	NT	15.100	2,100	4.110	60
22	Soil	N/A	N/A		2,100		60
23	Soil	11,694	11.9	1.160	2,100	0.280	60
24	Soil	10,664	10.8	0.220	2,100	1.200	60
25	Soil	11,381	11.6	0.070	2,100	4.680	60
26	Soil	9,200	9.1	0.030	2,100	1.840	60
27	Soil	9,110	9.3	0.390	2,100	0.690	60
28	Soil	10,470	10.6	0.910	2,100	0.170	60
29	Soil	10,503	10.7	0.790	2,100	0.410	60
30	Soil	10,000	9.9	0.120	2,100	4.470	60
31	Soil	10,045	10.2	-0.090	2,100	3.560	60
32	Soil	10,000	9.9	-0.100	2,100	1.550	60
33	Soil	N/A	N/A		2,100		60
34	Soil	11,118	11.3	-0.060	2,100	1.900	60
35	Soil	10,639	10.8	0.060	2,100	0.670	60
36	Soil	9,900	9.8	0.007	2,100	0.620	60
36A	Soil	9,900	9.8	-0.030	2,100	0.970	60
Average	Soil	10,452	10.511	1.391		2.625	
Standard Deviation	Soil	673	0.692	3.737		2.937	
Maximum	Soil	11,694	11.884	15.100		13.600	







M2350-1 Download Gamma Report

Survey Reason : Final Status	scription :SU009 Points and Scans Soil	augio i iono.
User ID : RLS2098	Technician Name : Lee Severtson	
Instrument Model : 2350-1	Instrument S/N : 117555	Instrument Cal. Due : 4/21/2010
Detector Model : H4-10	Detector S/N : 227358	Detector Cal. Due : 5/18/2010
Measurement Type : Gamma	Detector Type :: 3" x2"	VaI
Cal. Constant :	10.	Survey Date : 1/1/2010
Minimum µ R/h Observed:	Mean Observed:	Total Control of the
Maximum µ R/h Observed:	STDEV Observed:	# of Samples Taken: 71
Lee Severtson	Y. hu	
Print Name	Signature	11-9-59 Date
Print Name	Signature	Date

1 101 02 2	+ same location
ample # 0,1 taken twice a ample # 15 taken eccuntly, ,	or in field

Sign-Off Paul Ely Print Name Page 1 of 2

# Duratek Gamma Survey Report

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	14810°
SU009	L0001	0	1.1E+04	60	FADCT	Bodie	wi4	32	10000	6.3E+11
SU009	L0001	1	1.0E+04	60	i	ì	1	32	10000	6.3E+11
SU009	L0001	2	9.2E+03	60				26	10000	5.5E+11
SU009	L0001	3	9.6E+03	60			1.	19	10000	5.7E-11
SU009	L0001	4	1.1E+04	60	ari I		1	2	10000	6.5E+11
SU009	L0001	5	1.1E+04	60	5.1 L			4	10000	6.6E+11
8000a	L0001	6	1 1E+04	60	0	4		_5	10000	6.5E+11
SU009	L0001	7	1.1E+04	60	- 1			1	10000	6.6E+11
SU009	L0001	8	1.1E+04	.60			1	3	- 10000	6.4E+11
SU009	L0001	9	9.7E+03	60			1	12	10000	5.8E+11
SU009	L0001	10	1.0E+04	60			1 .	30	10000	6.DE+11
5U009	L0001	11	9.9E+03	60	3 I I			34	10000	5.9E+11
SU009	L0001	12	1.1E+04	60			4	20	10000	6.7E+11
SU009	L0001	13	1.1E+04	60			1	17	10000	6.4E+11
80009	L0001	14	1.1E+04	60	+	+	+	(1	10000	6.6E+11
SU000	L0001	15	4.7E+04	60					10000	2.8E+12
										not used

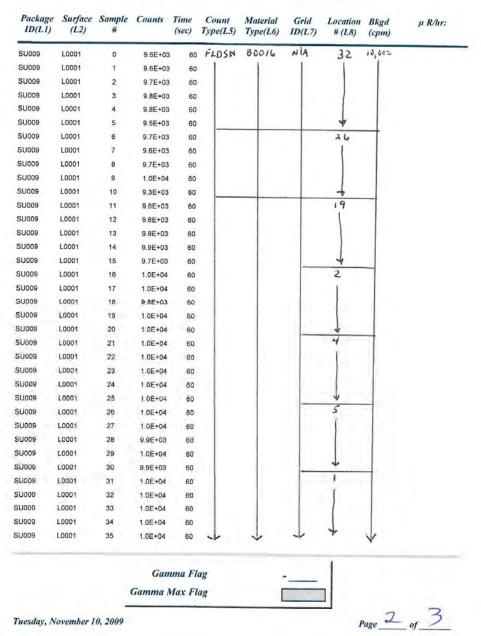
	Gamma Flag		
Tuesday, November 10, 2009	Gamma Max Flag		Page 2 of 2



M2350-1 Download Gamma Report

er ID: RLS		Technician Name: 1 - C	12.2
strument Model	2098	Technician Name: Lee Seren	
1720-17 008-01-2-0	OF FACILITY OF THE PARTY OF THE	Instrument S/N : 117573	Instrument Cal. Due: 4/18/30
tector Model	: 44-10	Detector S/N : 157372	Detector Cal. Due : 4/21/2010
asurement Typ		Detector Type : 2" x 2" Na.	
I. Constant	: 1.00E+00	- No.	Survey Date : 11/9/2009
		0 Mean Observed: 762918750000	
ximum µ R/h C	observed: 2808360000	00 STDEV Observed: 546600459591	# of Samples Taken: 16
4.11	carrier-	u,	
Lea	Severtson	fu is	11-10-09
	Print Name	Signature	Date
	Print Name	Signature	Date
	A	A. 1717 A.	3.00
Comments:	Gamma Me	rascrements hot to	hen at togetions PER
Comments:	Gamma Me 15 and 21.	easurements hot you They were missed.	ben at locations PEly
Comments:	Gamma Me 15 au 8 21.	rascrements hot you They were missed.	ben at locations PEly
Comments:	Gamma Me 15 au 8 21,	rascrements hot you They were missed.	ben at locations PEly
Comments:	Gamma Me 15 au 8 21,	rascrements hot you They were missed.	ben at locations PEly
Comments:	Gamma Me 15 au 8 21,	rascrements hot you They were missed.	ben at locations PEly
Comments:	Gamma Me 15 au 8 21,	ascrements hot you They were missed.	ben at locations PEly
Comments:	Gamma Me 15 au 8 21,	ascrements hot you They were missed.	ben at locations PEly
Comments:	Gamma Me 15 au S 21.	rasevenents hot the They were intered.	ben at locations PEly
Comments:	Gamma Me 15 au S 21.	Pasevenents hot to They were missed.	ben at locations PER
Comments:	Gamma Me 15 au 8 21.	Pasevenents hot to They were intered.	ben at locations PER
Comments:	Gamma Me 15 au 8 21.	Pasevenents hot to They were missed.	ben at locations PER
Comments:	Gamma Me 15 au 8 21,	Pasevenents hot to They were missed.	ben at locations PER
Comments:	Gamma Me 15 au 8 21,	Pasevenents hot to They were missed.	ben at locations PER
Comments:	Gamma Me 15 au 8 21.	Pasevenents hot to They were intered.	ben at locations PER
Comments:	Gamma Me 15 au 8 21.	Pasevenents hot to They were intered.	ben at locations PER
Comments:	Gamma Me 15 au 8 21.		ben at locations PEly
	Gamma Me 15 au d 21.		
	Gamma Me 15 au d 21.		
	Gamma Me 15 and 21.	Paul El	ben at locations  PER,  12/9/09 Date

## Duratek Gamma Survey Report

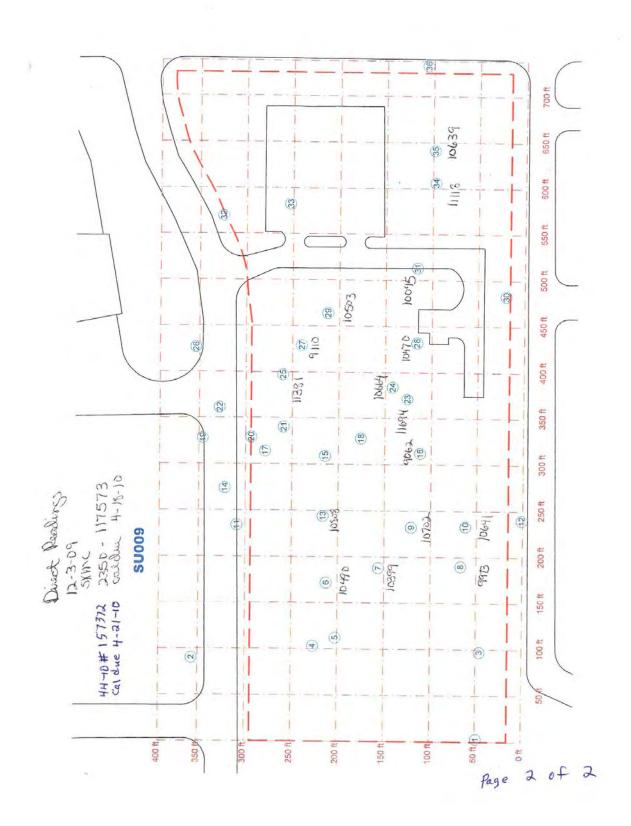


Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	μ R/hr:
SU009	L0001	36	1.0E+04	60	FLOSN	30016	NIA	3	10,000	
SU009	L0001	37	1.0E+04	60	1	1	1	1	1	
SU009	L0001	38	1.0E+04	60			- 1	1	- 1	
SU009	L0001	39	9.8E+03	60						
SU009	L0001	40	1.0E+04	60		- 1		4		
SU009	L0001	41	9.6E+03	60				12		
8U009	L0001	42	9.7E+03	60	- 1			ĺ		
SU009	L0001	43	9.8E+03	60	34K		- 1	1		
SU009	L0001	44	9.7E+03	60	- 1/-		100		1	
SU009	L0001	45	9.7E+03	60	- 1	- 1		+		
SU009	L0001	46	9.5E+03	60				30		
		47	9.6E+03	60			1	1	1	
SU009	L0001	48	9.7E+03	60				1		
SU009	£0001	49	9.6E+03	60	>			1	- 1	
SU009	L0001	50	9.7E+03	60		1		4		
8U009	L0001	51	9.7E+03	60	# 3 E			36		
SU009	L0001	52	9.8E+03	60	210			1		
8U009	L0001	53	9.8E+03	60			1	1		
SU009	L0001	54	1.0E+04	60		1		1		
900US	L0001	55	1.0E+04	60				+		
900US	L0001	56	1.0E+04	60	- 1			10	- 1	
900US	L0001	57	9.9E+03	60	1	1		1		
900US	L0001	58	1.0E+04	60				- 1		
		59	1.0E+04	50						
80009	L0001	60	1.0E+04	60				+	_	
80009	L0001	61	1.0E+04	60				17		
S0009	L0001	62	1.0E+04	60				1		
SU009	L0001	63	1.0E+04	60				1		
80009	L0001	64	1.0E+04	60					F	
U009	L0001	65	1.0E+04	60		4		4		
U009	L0001	66	1.0E+04	60				44		
U009	L0001	87	1.0E+04	60				1		
0009	L0001	88	1.1E+04	60						
EU009	L0001	69	1.1E+04	60		100	1	+	4	
92006	L0001	70	1.0E+04	60	1	-	-			



## RADIATION PROTECTION SURVEY FORM

	D: Eagle Pich			Survey	Log #: Ef	186 603
ech (prir	nt): Shappy M	CC hesney	Location: Eggle Picher Site	RHWP#		
In	strument(s) L	ľsed "	Purpose of Survey	Date:	12-3-0	9
Model	S/N	Cal. Due	Soil sample field	Time:	08:30	
1350	117573	4-18-10	counts per f55 Survey	Sample #:	NIA	
74-10	157372	4-21-10	parkace SUDDA. See	Sample #:	AIN	
presy	12/9/09		attached map for survey	Air Sample	#: N/A	
,			location and READINGS	A/S Result	s (DAC):	
			All dose rates in uR/hr unless noted.	Smear #	Contamination	(dpm/100 cm
				Offical II	alpha	beta
Dine	- 1. 00		4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	1	NA	NA
- NAC	· Ango com	as benjare	nd on location 6,7,8,9,3,28,29,31,34,35.	2		111
10,1	3, 16, 23,	24,25,2	1, 28, 29, 31 34,35.	3	- 1 - a	
			, , , , , , , , , , , , , , , , , , , ,	4	1 - A 1 - A 1	rail!
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				11		
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				16		
				17		1-5-1
				18		
				19		h 11
				20		V
OMMENT:	S:			LAW - Larg Area Wipe		Boundary
				□ - Tritium Smear Δ - Air Sam # - Direct fri	F - Foot I K = 1000 ple	evel
	By / Date:	ren 12	Reviewed by / Da  -3-09  Reviewed by / Da	te: Elg	12/9/0	9



## 4.3.10 SU009B-Removed Drain Line and Related Site Soil Area

This survey package was added to include the survey of the end of the remaining site drain line after the building drain lines were removed, the soil in the trenches generated during the drain line removal and soil in the area where excavated soil was temporarily stored during drain line excavation.

Summary results are provided in Tables 4-11 and 4-12 which are followed by the survey package, survey forms with survey maps, survey data sheets, smear results from the Packard Tri-Carb Liquid Scintillation counter, charts presenting the survey data, and the laboratory analytical results.

**Table 4-11: SU009B Summary Results** 

Summary Survey Unit 009B Removed Drain, Class 3	Beta Fixed Reading (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm <sup>2</sup> )
Number	2	2	2
Average	5,510	707	181
Standard Deviation	0	127	14
Maximum	5,510	796	191

**Table 4-12: SU009B Soil Summary Results** 

Summary Survey Unit 009 Soil Areas, Class 3	Gamma Points (μR/hr)	H-3 in Soil (pCi/g)	C-14 in Soil (pCi/g)
Number	9	10	10
Average	9.0	20.63	1.80
Standard Deviation	0.3	32.63	8.20
Maximum	9.4	112.00	24.00



### FSS Survey Package Worksheet for EaglePicher SU009B

Package Identification No.: SU009B	Prepared by: Paul C. Ely
Location: Removed Drain Pipe & Related Site Soil Area	Date Prepared: 12/22/2009
Area Classification: Class 3	Signature: Faul Ely

#### Area Description

The survey area includes the remaining portion of the drain pipe and soil areas where the drain pipe was removed and areas where removed soil had been temporarily staged.

#### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

#### **General Survey Instructions**

- 1. Perform soil surveys and sampling according to procedure CS-FO-PR-003 and this instruction.
- Survey the interior end of the remaining section of drain pipe using a Ludlum Model 177 with 44-9 pancake G-M Detector. In addition obtain smears from the interior end of the pipe.
- Use a 2" by 2" NaI detector, Ludlum model number 44-10, or equivalent as approved by the ES PM for exposure rate soil surveys. Obtain and record a dose rate measurement at each sample location at about 6-in above the soil surface.
- 4. Sample locations are indicated on the attached figure.
- Using hand tools, obtain a ~ 1,000 ml surface sample (~0 to 6-in deep) from the sample location. Place the sample into a gallon size large Ziploc® type bag and label the container with the sample information. A Chain-Of-Custody form will be completed for each sample sent offsite.
- After each use, thoroughly clean all parts of the soil sampling tool. Cleaning is accomplished with a nylon brush, clean water and phosphate-free soap. Then rinse with clean water.

1 of 5 Page 1 012

Rev. 0

Survey Package Worksheet SU009B (cont'd)

Biased measurement and sampling locations.  Survey package.  Survey package.  Survey package activity.  Attach photographic records if available and provide description to the attached map provides measurement and sampling locations.  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Direct Survey Comments  Survey Signatures:  Survey Comments  Sur	• Sou	rrce check in	strumenta	Source check instrumentation to Cs-137 for gamma measurements.	7 for ga	mma mea	suremen	ts.	•	Notify the	ES Proje	xt Manag	Notify the ES Project Manager of locations that exceed measured activity	tions that e	exceed measur	ed activit
Location Codes	Bia 3 sr The	arvey packag attached m	ge. ap provide	sampling loca	ations w	ere gener ampling l	ated for ocations	this Class	•	Vitach ph	ter than the otographic for each	ne averagi c records image ur	if availab	le and proy	vide descriptiv	ę.
Location Codes					Surv	ey Perfor	mance (	Initial ar	ıd date a	is each it	em is cor	(pajeted)				
1		Location Cod	les	- Constant	Doto	0	Disease				Н-3 &		i		:	,
Surface   Material     Initial     Geo     Initial     Geo     Researce   Researce     Researce	17	[2]	97	Description	_	Tech	α, β γ	Tech	Alpha	Survey	C-14 Smears	Survey	Gamma	Survey	Soul	Survey
cage         Surface         Material         Imitial         @60         Initial         @60         Initial         @60         Initial         @60         Initial         @60         Res         Com         Date         Cm         N/A         N/A <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>EagleP</td><td>icher SU</td><td>009B CI</td><td>ass 3 Ar</td><td>63</td><td></td><td></td><td></td><td></td><td></td></t<>							EagleP	icher SU	009B CI	ass 3 Ar	63					
99B P0001 B9999 Pipe N/A	Package ID		Material Code			Initial & Date	99ec	Initial & Date	@60 sec	Initial & Date	@10- cm	Initial & Date	@100 cm	Initial & Date		Initial & Date
69B         L0001         B0016         Soil Area         N/A         10         10           ee         a.flacked         Survey         Comments         Survey         Comments         Package Review           ee         a.flacked         Survey         Sheets         Sheets           e. Package Completed:         11 /30 /3009         Au         CES         12/22/09           kage Review by and Date (Signature):         Mul (CES         12/22/09         Au	SU009B		B9999	Pipe	N/A	N/A	1	*	N/A	N/A	2	*	N/A	N/A	N/A	N/A
Survey Comments  Package Review  Package Revie	SU0009E		B0016	Soil Area	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10		10	
ee a factued Survey Sheets.  Package Review  veyor(s) Signatures: On affactued Survey Sheets  to Package Completed: 11/30/2009  kage Review by and Date (Signature): Au(C Elgo 12/22/09								Survey	Comme	nts						
Package Review  Veyor(s) Signatures: On affacted Survey sheefs  Package Completed: 11 /30 / 200 9  Kage Review by and Date (Signature): Au (C & 12/22/09	200			hand	hee	15.										
veyor(s) Signatures: On affactured survey sheets  Package Completed: 11/30/2009  kage Review by and Date (Signature): Level Completed: 12/22/09								Packag	e Revier	3						
kage Review by and Date (Signature): Pew (C Ele 12/22/09	Survey Date Pa	or(s) Signat	ij		ched			heet								
	Packag	e Review by	y and Date	e (Signature)	-	1 13	0	m	12/0	22/00	4					
	0						3									a of 5

## RADIATION PROTECTION SURVEY FORM

ech (prin	t):		Location: Engle Pict	ne 2	RHWP#	: N/A	
Ins	strument(s)	Used	Purpose of Survey		Date:	11-24-0	9
Model	S/N	Cal. Due	harations of Stil	Samoles	Time:	0800	
			TAKEN APTER PEM	cuel of	Sample #:	NI	A
	1)		drain Lines + 30		Sample #:		
	1		A		Air Sample	#:	
	A		2		A/S Result	s (DAC): 🕏	
			All dose rates in uR/hr unless	s noted	Smear #	Contamination	(dpm/100 cm
				7 110100.	Omou. II	alpha	beta
		LAI	D AREA N		1		
					2		
	3.7	2	2.10		3	1	
1	3-8	} speils	8-3		4	1	
	3-4				5		
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1	3-5	132			7		
1				Ē	8		
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B-6	B-6	10.	3-9		10	, ,	1-
- 1		1	g-9 spoils pile		11		1
	1	1	-1		12		
				1	13		
1					14		
					15		
		10.000	5	*******	16		1
5+ A	tic Poin	st REAdin	3-3 8709 B-4 B-7 9229 B-8 2:8920	8170	17		1
3-1	8961 B	J 8818	3-3 8709 5-7	0000	18		
B-2	8102	13-6 9072	13-7 4224 5	0 1 1-	19		1 1 1
3-9	9245	BACKBronn	2 2 1 40		20		
OMMENTS S	SATE OY, S: METE SAMPles FHER RI	R 2350 -	1 Due04-21-10	6 Probe Luggia	LAW - Larg Area Wipe O - α/β Sm D - Tritium Smear Δ - Air Sam # - Direct fr	ear H - Head F - Foot K = 1000	level
	By / Date:	11-24		ed by / Dat	7	11 - 30 -	2005

3 of 5

## RADIATION PROTECTION SURVEY FORM

Project I	D: Eagle Picl				Log #: EF	
Tech (prin	nt): Richard	Y. Stoney	Location: EAGLE PICHER	RHWP #	: EPPS-	09-000
In	strument(s) l		Purpose of Survey		1-24-20	09
Model	S/N	Cal. Due	Post Demolition Smar Sunse	Time: 1	0:30	
-177	45602	10-1-2010	of pipe ourning West to EAS	Sample #:	1	
44-9	176080	10-1-2010	to Main Municipal Sewage	Sample #:	A	-
			System.	Air Sample		
				A/S Result	s (DAC):	1
			All dose rates in uR/hr unless noted.	Smear #		dpm/100 cm²
				1 1	alpha	-
				2.4	JEE M	ACHED
				3	( V	- V
				4	1	1
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	<del>- y</del>	× ×	× × × TA	7	1	
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				10	1	
			6 - #1 #7 = V	11	,	1
			5 mears #1, #2 Taken on	12	./	11
		TX	e interior of Pipe Surveyed	13	N	
		To.	<100 Nopm above Background	. 14		
			1 3	15		
				16		
				17		
111	7.1	2100/	calamalall Parad	18		
XX	Denotes	Pipe	contoninated) Romoved ced in Intermodul	19		\
from E	xcavation	and Pla	ced in Intermodul	20		
CONTO OMMENT	Si Post De aken to	Shippm molition "Aptuit	of Piping Smears "for Counting.	□ - Tritium Smear △ - Air Sam # - Direct fr	ear H - Head F - Foot K = 1000	level
Richa	By / Date:		Reviewed by / Da	te:	/2009	

Page 1of 2

4 of 5 pre 12/22/09

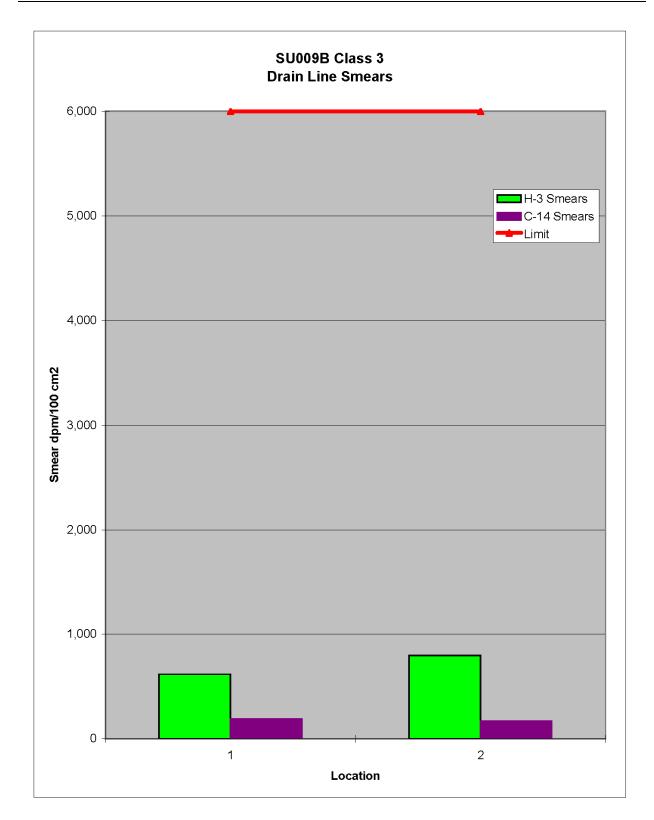
Jurray EP-09-092

Page # 1 QuantaSmart (TM) - 2.03 - Serial# 061925 11/24/2009 10:39:26 AM User: CLINDT Protocol# 2 - WIPES.lsa Assay Definition-Assay Description: Assay Type: DPM (Dual) Report Name: WIPE TEST Output Data Path: C:\Packard\Tricarb\Results\CLINDT\WIPES\20091124\_1032 Raw Results Path: C:\Packard\Tricarb\Results\CLINDT\WIPES\20091124\_1032\20091124\_ 1032. results Assay File Name: C:\Packard\TriCarb\Assays\WIPES.lsa Count Conditions-Nuclide: 3H-14C Quench Indicator: tSIE/AEC External Std Terminator (sec): 0.5 2s9 Pre-Count Delay (min): 0.00 Quench Sets: Low Energy: 3H Mid Energy: 14C Count Time (min): 1.00 Count Mode: Normal Assay Count Cycles: 1 Repeat Sample Count: 1 #Vials/Sample: 1 Calculate & Reference: Off Background Subtract: On - 1st Vial Low CPM Threshold: Off 2 Sigma & Terminator: Off LL Regions UL Bkg Subtract 1st Vial 0.0 12.0 B 12.0 156.0 1st Vial C 0.0 0.0 1st Vial Count Corrections-Static Controller: On Luminescence Correction: n/a Colored Samples: Off Heterogeneity Monitor: n/a Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75 Half Dife-Half Life Correction: Off Regions Units Reference Date Reference Time Half Life C 4-3 C-14 C-14 Cycle 1 Results CPMA CPMB DPM1 S# Count Time DPM2 SIS tSIE MESSAGES Missing vial 1. 2 1.00 11 65.74 491.23 3 1.00 151 132.82 134.55 81 617 191 17.66 99 4 1.00 142 796 171 16.36

Page 2 of 2

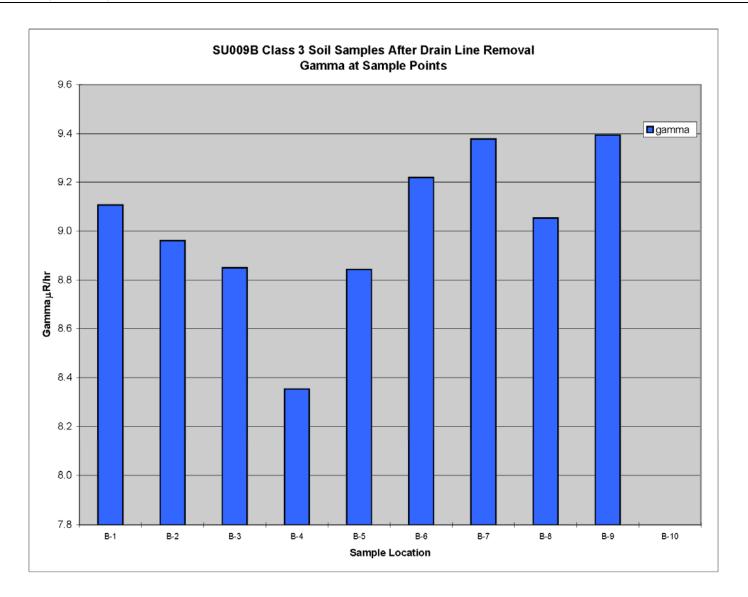
5 of 5 Pre 12/22/09 EaglePicher FSS Data Sheet Survey Unit 009B Remaining Drain Line Survey

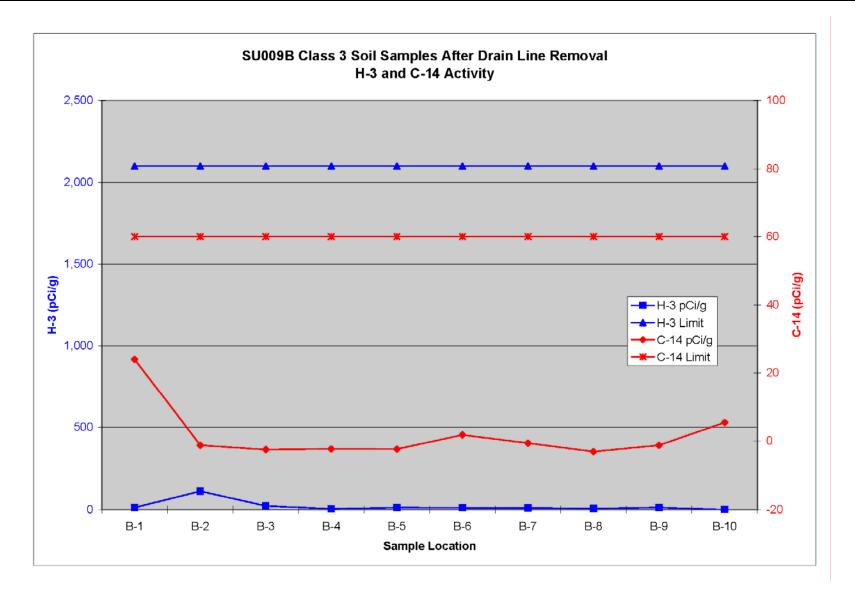
<b>Detector Type</b> Ludlum 44-9	Detector SN 176080	Detector (cm²) 15	Detector Cal Due 10/1/10	Meter Type 177	<b>Meter SN</b> 45602	<b>Meter Cal Due</b> 10/1/10
			α+β+γ	H∹	3	C-14
Survey			Fixed Reading	Smear	Limit	Smear
Point	Lo	c.*	(cpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )
1	Р	Pipe	5,510	617.0	6,000	191.0
2	Р	Pipe	5,510	796.0	6,000	171.0
Average			5,510	706.5		181.0
Standard Deviation			0	126.6		14.1
Maximum			5,510	796.0		191.0
* R = Roof, F = Floor, W	= Wall, C = Ce	iling, E = Equi	pment			



EaglePicher FSS Data Sheet Survey Unit 009B Soil Samples After Drain Line Removal

Detector Type Ludlum 44-10 (gamma) Detector Ca	Detector SN 157372 alibration Con	Detector (cm²) 2x2 Nal stant (Counts/R):	Detector Cal Due 4/21/10 5.904E+10	Meter Type 2350-1	<b>Meter SN</b> 117573	<b>Meter Cal Due</b> 4/18/10	Background (cpm) 8,920
		Gamma	Gamma	H-3	)	C-	-14
Survey		Fixed Reading	Fixed Reading	Sample	Limit	Sample	Limit
Point	Loc.*	(cpm)	(μR/hr)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
B-1	Soil	8,961	9.1	12.400	2,100	24.000	60





## 4.3.11 SU010-Mechanical Room Floor

The Machine Room floor had some areas in excess of limits (60,000 dpm/100 cm<sup>2</sup>). Most of these areas were decontaminated and the Machine Room floor was changed to a Class 1 area (SU010) and resurveyed. One area of the floor was removed as radioactive waste and this area was removed from the Final Status Survey (FSS).

Summary results are provided in Table 4-13 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

**Table 4-13: SU010 Summary Results** 

Summary Survey Unit 010	Beta Fixed Reading	Beta Scan Maximums (dpm/100cm <sup>2</sup> )	H-3 Smear	C-14 Smear
Mechanical Room Floor, Class 1	(dpm/100cm <sup>2</sup> )	(upin/100cm)	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )
Number	21	21	21	21
Average	11,283	11,403	85	84
Standard Deviation	6,673	N/A	61	39
Maximum	31,874	50,394	240	165



### FSS Survey Package Worksheet for EaglePicher SU010

Package Identification No.: SU10F/SU10S	Prepared by: Paul C. Ely
Location: Mechanical Room	Date Prepared: 10/28/2009
Area Classification: Class 1	Signature: Paul Ely

#### Area Description

The survey area includes the floors only.

## **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

## **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - ε<sub>t</sub>, the total beta efficiency = ε<sub>i</sub> \* ε<sub>s</sub>
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 100% scan of floor for beta contamination.
- 3. Perform direct beta surface activity measurements at each measurement location. Mark the survey locations with a felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the survey unit. Systematic survey locations were generated for this class 1 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm² in size at each measurement location
  provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Survey Package Worksheet SU10F/SU10S (cont'd)

Sou 3,00 Perf plas Log cpm	Source check instrumentation to C- The static MDC for total beta activi 3,000 dpm/100 cm². Perform a minimum of three one-m plastic shield on the survey surface. Log scan measurements or record n cpm on a Grid Scan Record.	nstrument C for total cm². mum of th n the survements of Scan Reco	2 8 10 20 20 20 20 20 20 20 20 20 20 20 20 20	for bet measur te field imum s	to C-14 for beta measurements.  Ictivity measurements shall be ne-minute field backgrounds us face.  ord maximum scan measurements.	ments. all be le inds usii	ss than ng the results in		Measur rectangu location coordin The atta	ment an ular patte to the ne ates for tl	Measurement and sampling locat rectangular pattern. If any locatic location to the nearest usable location to the nearest usable location used. The attached map provides floor in the attached map provides flore in the attached map provides floor in the attached	g location / location ible location n used.	s are based s inaccessil n and docu	Measurement and sampling locations are based on a random-start rectangular pattern. If any location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.  The attached map provides floor measurement and sampling locations.	tart neasurement y xeations.
				Sur	Survey Performance (Initial and date as each item is completed)	rmance	(Initial a	nd date	as each	item is c	completer	1)			
T	Location Codes	les			-	-	-							Smear	
5	1.2	P7	General	Scan	Survey	Direct	Survey Tech	Direct Alpha	Survey	Alpha Scan	Survey	Direct Gamma	Survey	Gross (Liq. Scint.)	Survey
						Eagl	EaglePicher SU010 Class 1 Area	U010 C	lass 1 Ar	ea.					
Package ID	Surface or Structure	Material Code			Initial & Date	@60 sec	Initial & Date	@60 sec	Initial & Date		Initial & Date	@100 cm	Initial & Date	В	Initial & Date
SU10F	F0001	B0012	Floor	N/A	MARE	21	10-2809	NA	N/A	N/A	N/A	N/A	N/A	21	430
S010S	F0001	B0012	Floor	%001	10-28-09	N/A	NA STATE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Survey Comments  Survey Direct Survey Direct Survey Scient Tech Gamma Tech (Liq. Scint.)  Survey Comments  Package Review				Surve	Survey Performance (Initial and date as each item is completed)	mance (	Initial a	nd date	as each	item is c	ompleted	0			
Survey Comments  Survey Comments  Package Review  Package Review	Location Codes				(	1								Smear	
Survey Comments  Package Review  109	12	9	Description		Survey	_	Survey	Direct Alpha	Survey	-	Survey	Direct Gamma	Survey	Gross (Liq. Scint.)	Survey Tech
100   May															
100   May															
100   Ross															
100 / POI															
100 / POI															
109 / Ros							Survey	Сотте	nts						
109 / Roh															
109 / hoh															
109 / Mah															
109 / Pich							Packao	re Revie							
60,	urveyor(s) Signatures:		of or			R	1 En	7	(						
	late Package Completer	:	10/29	109		2									
	Package Review by and Date (Signature):	Date	(Signature):	13	128	601									

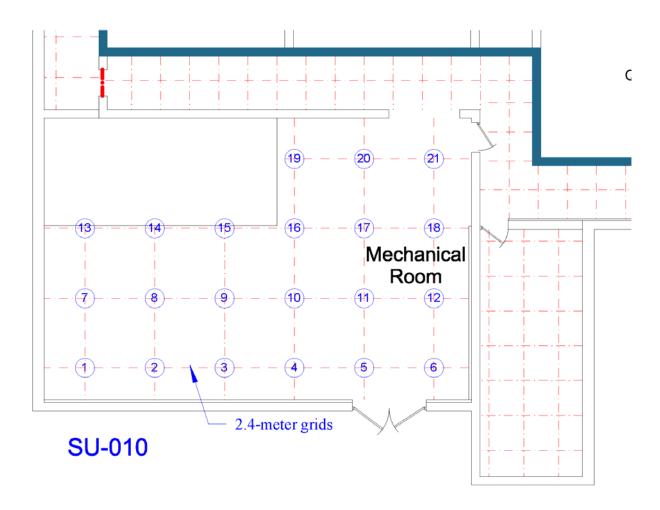


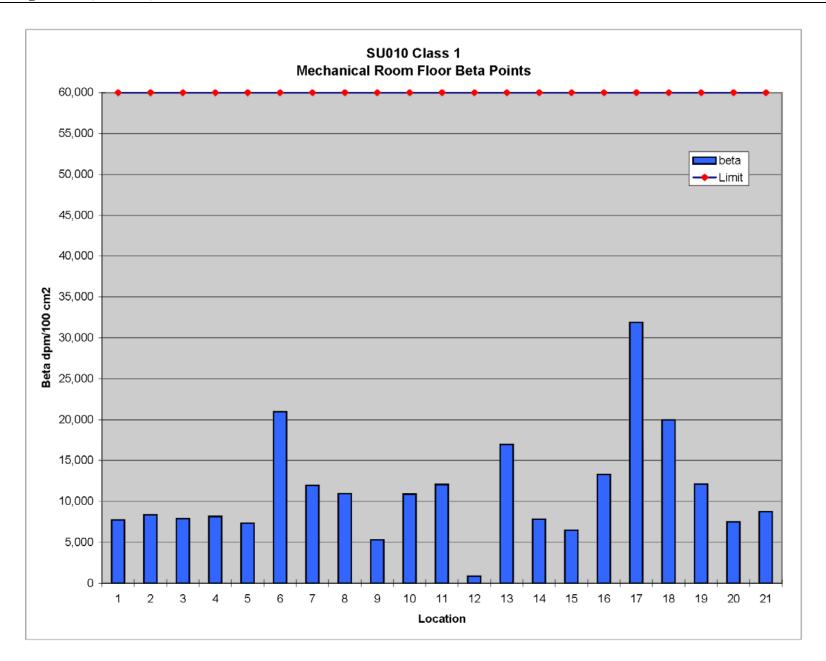
Figure 4-11 SU010 Survey Map

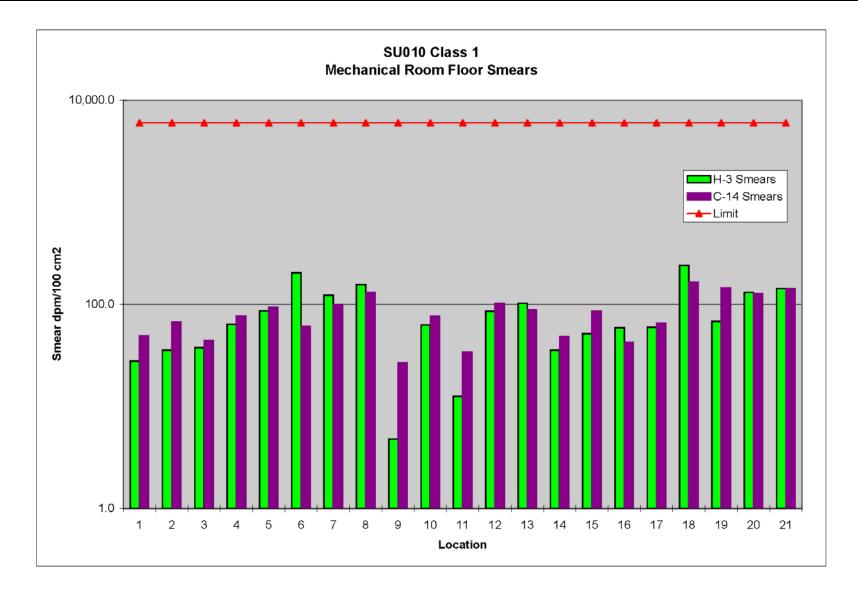
EaglePicher FSS Data Sheet Survey Unit 010 Mechanical Room

#### Detector

Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

			Be	eta	H-3	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )				
1	1	Floor	7,715	60,000	27.8	6,000	49.4
2	2	Floor	8,344	60,000	35.6	6,000	67.1
3	3	Floor	7,902	60,000	37.9	6,000	43.8
4	4	Floor	8,146	60,000	63.7	6,000	77.3
5	5	Floor	7,307	60,000	86.0	6,000	92.8
6	6	Floor	20,966	60,000	202.0	6,000	60.9
7	7	Floor	11,922	60,000	122.3	6,000	99.0
8	8	Floor	10,955	60,000	155.2	6,000	130.3
9	9	Floor	5,291	60,000	4.8	6,000	26.9
10	10	Floor	10,862	60,000	62.6	6,000	76.0
11	11	Floor	12,039	60,000	12.6	6,000	34.1
12	12	Floor	874	60,000	85.1	6,000	101.8
13	13	Floor	16,945	60,000	101.6	6,000	88.1
14	14	Floor	7,808	60,000	35.7	6,000	48.5
15	15	Floor	6,445	60,000	51.5	6,000	85.6
16	16	Floor	13,274	60,000	59.1	6,000	42.3
17	17	Floor	31,874	60,000	59.6	6,000	64.8
18	18	Floor	19,987	60,000	240.3	6,000	164.5
19	19	Floor	12,074	60,000	68.0	6,000	143.5
20	20	Floor	7,482	60,000	130.2	6,000	127.7
21	21	Floor	8,729	60,000	141.8	6,000	140.9
Average	F	Floor	11,283		84.9		84.1
Standard Deviation	F	Floor	6,673		61.4		39.2
Maximum	F	Floor	31,874		240.3		164.5





Print Name



M2350-1 Download BETA Report

Date

Survey Reason : Final Status		
User ID : CCB6686	Technician Name : Catherine Ba	rba-Abay
Instrument Model : 2350-1	Instrument S/N: 80502	Instrument Cal. Due : 9/30/2010
Detector Model . 43-68b	Detector S/N: 095523	Detector Cal. Due : 9/30/2010
Measurement Type : BETA	Detector Type : 02200 : 126 cm2	Gas Proportional Detector
Detector Area : 126	Efficiency: 0.0681	Survey Date : 10/28/2009
Minimum Net DPM Observed: -128	Mean Net DPM: 11019	
Maximum Net DPM Observed: 45754	STDEV Observed: 10030	# of Samples Taken: 26
Catherine Barba-Abay	-6-	en kelni
Print Name	Signature	Date

Signature

Scannel and all results were le	ss tran
3000 (Patore Sactgrown). This, 3 30,068 dpm/100 cm², 3000 cpm - 420 cpin (background) 580 cpm = 0.068   cpm/dpm (Efficiency) - 126 cm²) : 30,068 dpm/100 cm² PEly	122580 CPM
500 cpm = 0.068 cpm/dpm (Efficiency) - 126 cm2	V 100 Cm 2
= 30,068 dpm/100cm2 PEg	(-10
,	
	/.

Sign-Off PAUL ELY Signature 10/29/09
Print Name Y Signature 10/29/09
Page 1 of 2

# Duratek Beta Survey Report

Download File Name: 00000038

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU10F	F01	0	409.0	60	FLDBK	B9999	ZZZZZ	1	420	-128
SU10F	F01	1	1,082.0	60	FLDCT	B9999	ZZZZZ	1	420	7,715
SU10F	F01	2	1,136.0	60	FLDCT	B9999	27777	2	420	8,344
SU10F	FD1	3	1,098.0	60	FLDCT	B9999	27777	3	420	7,902
SUMOF	F01	4	1,119.0	60	FLDCT	B9999	72772	4	420	8.146
SU10F	F01	5	1,047.0	60	FLOCT	B9999	77777	5	420	7,307
SU10F	F01	6	2,219.0	60	FLDCT	B9999	ZZZZZ	6	420	20,966
SU10F	F01	7	1,443.0	60	FLDCT	B9999	22222	7	420	11,922
SUIOF	F01	8	1,360.0	60	FLOCT	B9999	7,7,7,7	8	420	10,955
SU10F	F01	9	874.0	60	FLDCT	B9999	22272	9	420	5.291
SU10F	F01	10	1,352 0	60	FLDCT	89999	27777	10	420	10,862
SU10F	F01	11.	1,453.0	60	FLDCT	B9999	27777	31	420	12,039
SUIOF	F01	12	439.0	60	FLDBK	B9999	77777	2	420	221
SU10F	F01	13	495.0	60	FLDCT	B9999	ZZZZZ	12	420	974
SU10F	F01	14	1,874.0	60	FLDCT	B9999	22272	13	420	16,945
SUTOF	FOT	15	1,090.0	60	FLDCT	B9999	27777	14	420	7,808
SU10F	F01	16	973.0	60	FLDCT	B9999	22772	15.	420	6,445
SU10F	F01	17	1,559.0	60	FLDCT	89999	77777	18	420	13,274
SU10F	F01	18	3,155.0	60	FLDCT	B9999	77777	17	420	31,874
SU10F	F01	19	2,135.0	60	FLDCT	B9999	22222	18	420	19,987
SUTOF	F01	20	1,456.0	60	FLOCT	B9999	27772	19	420	12,074
SU10F	FQ1	21	1,062.0	60	FLDCT	89999	ZZZZZ	20	420	7.482
SUIOF	F01	22	1,169.0	60	FLOCT	B9999	27272	21	420	8.729
SU10F	F01	23	413.0	60	FLDBK	89999	22222	3	420	-82
22222	22222	24	3,256.0	600	РТВВК	B9999	22272	1	0	3,795
77777	77777	25	3,926.0	.60	PTSC1	89999	27722	1	0	45,754

 Beta Flag
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 Beta Max Flag
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Wednesday, October 28, 2009

Page 2 of 2



M2350-1 Download BETA Report

File Name : 00000043 Survey Descri	ption: SU10 Scans plus post decon	points
Survey Reason : Final Status		
User ID : RPS2366	Technician Name : Richard Ston	ey
Instrument Model : 2350-1	Instrument S/N : 95359	Instrument Cal. Due : 9/30/2010
Detector Model : 43-68b	Detector S/N: 119337	Detector Cal. Due : 9/30/2010
Measurement Type : BETA	Detector Type : 02200 : 126 cm2	Gas Proportional Detector
Detector Area : 126	Efficiency: 0.0938	Survey Date : 10/29/2009
Minimum Net DPM Observed: -203	Mean Net DPM: 22702	
Maximum Net DPM Observed: 128490	STDEV Observed: 34113	# of Samples Taken: 35
Richard Stoney	Robert Por	- 10-29-2009
Print Name	Signature 0	Date
Print Name	Signature	Date

omments:	N5		

Sign-Off PAUL ELY Print Name | Page 1 of 2

# Duratek Beta Survey Report

Download File Nan	te: 00000043
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Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	(DPM/100cm2)  Decen person
ZZZZ	ZZZZ	0	3,683.0	600	PRBBK	B0002	77777	0	0	3,116 for Kints bil
ZZZZ	ZZZZ	1	4,156.0	60	PRSC1	B0002	22222	1	0	35 164 JUNE 1
7777	2777	2	4.278.0	60	PRSC1	B0002	22222	0	0	36,197 perform pres
SU10	FL01	3	1,314.0	60	FLDCT	B0002	77777	1	595	R ORA
SUID	FL01	4	3,322.0	60	FLDCT	B0002	ZZZZZ	2	595	23,073 711 # 22
SU10	FLOT	5	1.423.0	60	FLDCT	B0002	77777	3	595	7,006
SU10	FL01	6	6,551.0	60	FLOCT	B0002	22222	4	595	50 394
SU10	FL01	7	15,502.0	60	FLDCT	B0002	ZZZZZ	-6	595	126,130 52 (3)
SU10	FL01	8	2,712.0	60	FLOCT	B0002	22222	6	595	17,912
SU10	FL01	9	1,620.0	.60	FLDCT	80002	22722	7	595	8,673
SU10	FL01	10	2,607.0	60	FLDCT	B0002	ZZZZZ	1-13	595	17,024 5 ce# 19
SU10	FL01	11	1,381.0	60	FLDCT	B0002	22222	8	595	6,650
SU10	FL01	12	1,343.0	60	FLOCT	B0002	77777	9	595	6,329
SU10	FL01	13	2,302.0	60	FLDCT	B0002	27772	-14-	595	14,443 50e# 30
U10	FL01	14	1,428.0	60	FLDCT	B0002	ZZZZZ	15	595	7.048
U10	FL01	15	15,781.0	60	FLOCT	B0002	ZZZZZ	-10-7	595	128,490 See # 2 4
U10	FL01	16	1,511.0	60	FLDCT	B0002	ZZZZZ	10	595	7.750
SU10	FL01	17	13,959.0	60	FLDCT	B0002	ZZZZZ	10-20	595	113,074 501 # 13
U10	FL01	18	1,456.0	60	FLDCT	B0002	ZZZZZ	15	595	7,285
SU10	FL01	19	5,057.0	60	FLDCT	B0002	22222	-18	595	37,753 5004 27
U10	FLQ1	20	3,132.0	60	FLDCT	B0002	72272	12	595	21 466
U10	FL01	(21)	796.0	60	FLDCT	B0002	PTDCN	5	595	1,701 JOH DE DE
Uto	FL01	(22)	1,956.0	60	FLOCT	B0002	PTDCN	2	595	11,516
U10	FL01	23	787.0	60	FLDCT	B0002	PTDCN	20	595	1,625
U10	FLOT	24	7,169,0	60	FLDCT	B0002	ZZZZ	-24	595	55,623 SEC# 28
U10	FL01	25	1,860.0	60	FLDCT	80002	ZZZZ	19	595	10,703
U10	FL01	(26)	797.0	60	FLDCT	B0002	PTDCN	16	595	1,709
U10	FL01	27)	1,419.0	60	FLOCT	80002	PTDCN	18	595	6,972
U10	FL01	(28)	1,453.0	60	FLDCT	B0002	PTDCN	21	595	7,260
U10	FL01	29	2,275.0	60	FLDCT	B0002	PTDCN	13	595	14,215
U10	FL01	30	856.0	60	FLDCT	B0002	PTDCN	14	595	2,208
U10	FL01	31	573.0	60	FLDBK.	B0002	ZZZZ	21	595	-186
U10	FL01	32	571.0	60	FLDBK	B0002	7777	5	595	-203
U10	FL01	33	650.0	60	FLDBK.	B0002	ZZZZ	14	595	465
U10	FL01	34	585.0	60	FLDBK	80002	ZZZZ	2	595	-85

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Thursday, October 29, 2009

Page 2 of 2

-		_	9 08:55			BETA -	-					2 #1	_
Pro	toc	ol #	:24	S	mears	H-3 &	C-14			User : E	aglePich	er /	ES.
Time	:	1.	00										
Data	a M	ode:	Dual DPM			Nuclid	es: 3H	-14C		Quench			
Back	kgr	ound	Subtract: 1st	: Vi	al						Energy: Energy:	3H 14C	
			LL UL	1	LCR	25%	ВК	G					
-		A:	0.0 - 12.0		0	0.0	9.4	5					
Reg: Reg:			12.0 - 156		0	0.0	14.8						
			0.0 - 0.0		0	0.0	0.0	0					
FSS Coir Dela Proi	Sm nci ay	Std ears dence Befor	icator: tSIE/A Terminator: C in 20 ml Ulti Time(ns): 18 re Burst(ns): 3ta Filename: Filename: C:\	Countina (	Gold mal EP\PRO								
										H-3	C-14		
P#F AG	PID	5#	SMPL_	ID	TIME	CPMA	A:25%	CPMB	B:25%	100	DPM2	tSIE	F
24 B	9	1.			10.0	9.4	20.6	14.9	16.4			422	
24 W	9	2	SU10	FL	1.0	13.6	72.2	41.1	56.9	27,81	49.35	369	
24 W	9	3	SUIO	FZ	1.0	17.3	60.9	55.5	30.5	35.64	67.05	354	
24 W	9	4	SU10	F3	1.0	16.4	63.0	37.2	39.3	37.85	43.82	386	
24 W	9	5	SUIO	F4	1.0	26.7	45.7	65.0	27.B	63.74	77.25	359	
24 W	9	6	8010	F5	1.0	34,3	39.0	78.4	24.8	85.99	92.84	353	
24 W	9	7	SU10	F6	1.0	70.3	25.5	58.3	29.6	202.04	60.94	395	
24 W	9	8	SU10	F7	1.0	46.5	32.4	85.1	23.7	122.32	98.99	366	
24 W	9	9	SU10	F8	1.0	55.1	29.4	110.6	20.4	155.15	130.25	330	
24 W	9	10	SU10	F9	1.0	4.5	172	22.2	56.0	4.79	26.94	401	
24 W	9	11	SU10 F	10	1.0	26.6	45.8	64.1	28.0	62.62	76.03	366	
24 W	9	12	SU10 F	11	1.0	7.5	113	28,2	47.4	12.59	34.05	379	
24	16	13	SU10 F	12	1.0	36.6	37.5	86.1	23.5	85.05	101.79	375	
24	16	14	SU10 F	13	1.0	38.4	36.4	75.3	25.4	101.59	88.13	355	
<b>=</b> 4	16	15	SUIO F	14	1.0	15.9	64.5	40.8	37.1	35.72	48.47	373	
24	16	16	SUIO F	15	1.0	23.6	49.4	71.1	26.3	51.54	85.61	350	
24	16	17	SIJIO F	16	1.0	22.8	50.6	36.9	39.6	59.06	42.29	385	
24	16	18	SU10 F	17	1.0	25.4	47.1	55.2	30.6	59.62	64.83	385	
24 24		19	5U10 F		1.0	91.8		143.9		240.34	164.53 143.48	384	
47	4.4	20	milio e		1.0	20.0				68,00	143.46		

24 16 21 SU10 F20 1.0 51.9 30.4 108.7 20.6 130.22 127.71 366
24 16 22 SU10 F21 1.0 59.1 28.2 120.6 19.4 141.83 140.88 386

H-3 C-14

DPM DPM

# 4.3.11 SU011-Mezzanine Stairwell

The Mezzanine Stairwell floor and steps had some areas in excess of limits (60,000 dpm/100 cm<sup>2</sup>). The floor and steps were decontaminated and the area resurveyed as a Class 1 area SU011).

Summary results are provided in Table 4-14 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter. Note that the survey map only indicates 21 survey locations. These locations are all on the floor, the remaining survey locations are on the center of each of 20 steps leading to the mezzanine.

**Table 4-14: SU011 Summary Results** 

Summary Survey Unit 011 Mezzanine Stairwell, Class 1	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm <sup>2</sup> )
Number	41	41	41	41
Average	23,977	20,475	56.1	42.9
Standard Deviation	9,242	N/A	38.5	35.7
Maximum	47,817	33,005	144.8	177.0



# FSS Survey Package Worksheet for EaglePicher SU011

Package Identification No.: SU11F/SU11S	Prepared by: Paul C. Ely
Location: Stairwell to Mezzanine	Date Prepared: 10/28/2009
Area Classification: Class 1	Signature: Pau Ely

### Area Description

The survey area includes the floor in the stairwell area and the steps and landings up to the mezzanine.

# **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

# **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - $\varepsilon_t$ , the total beta efficiency =  $\varepsilon_i * \varepsilon_s$
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 100% scan of floor, steps and landings for beta contamination.
- 3. Perform direct beta surface activity measurements at each floor measurement location and on each step or landing. Mark the survey locations with a felt tip pen or equivalent. All floor surveys locations are referenced from the southwest corner of the survey unit. Systematic survey locations were generated for this class 1 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm<sup>2</sup> in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

# Survey Package Worksheet SU11F/SU11S (cont'd)

The static MDC for total beta activity measurements shall be loss than 3,000 dpm/loo cm².  Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in plastic shield on the survey surface.  Log scan measurements or record maximum scan measurement results in the survey technician.  Location Codes  Log scan measurements or record maximum scan measurement results in the survey technician.  Survey Performance (Initial and date as each item is completed)  Location Codes  Additional locations centered beta survey Beta survey Reproduces on the survey rechnician.  Survey Performance (Initial and date as each item is completed)  Location Codes  Survey Performance (Initial and date as each item is completed)  Survey Performance (Initial and Marc Scan Tech Scan Scores (Initial Score)  Survey Berformance (Initial and date as each item is completed)  Survey Berformance (Initial and Marc Scan Scan Tech Scan Scan Scan Scan Scan Scan Scan Scan	
Contain Codes   Coneral   Coneral   Coneral   Code   Cod	Floor measurement and sampling locations are based on a random-start rectangular pattern. If any location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.      The attached map provides floor measurement and sampling locations. Additional locations centered on each step and landing will be added by the survey technician.
Cartion Codes   General   Beta   Survey   Direct   Survey   Surv	al and date as each item is completed)
Surface   Material   Region   Initial   Region   Initial   Region   Regio	Direct
Surface or Code         Material Code         Initial Reservation or Code         Initial Reservation or Reservation or Code         Initial Reservation or Reservation or Code         Initial Reservation or Reservation or Reservation or Code         Initial Reservation or Reservation or Reservation or Code         Initial Reservation or R	( Andropella ( )
F0001   B0012   Floor   N/A   WAPVE   PC   DESCRIPTION   N/A   N	@60 sec
F0001   B0012   Floor   100%   N/A   N/A	N/A N/A N/A
S0001 B0012 Steps N/A WRCE 147.3D DIOSAGE N/A N/A S0001 B0012 Steps 100% DESCRIPTION N/A N/A N/A N/A	N/A N/A N/A N/A N/A N/A
S0001 B0012 Steps 100% (Seps N/A N/A) N/A N/A	N/A
	N/A N/A N/A N/A N/A N/A

		Surve	Survey Performance (Initial and date as each item is completed)	mance (	Initial a	nd date	as each i	tem is co	ompleted	0			
Location Codes				1								Smear	
LI 1.2 L6	Description	Scan	Survey	Direct	Survey	Direct Alpha	Survey Tech	Alpha Scan	Survey	Direct Gamma	Survey	Gross (Liq. Scint.)	Survey
								Ā					
					Survey	Survey Comments	nts						
										П			
					Packag	Package Review	×						
Surveyor(s) Signatures: Shouse, Old January	The The	2	W. San	C	4								
Date Package Completed:	10/29	109	7	P									
Package Review by and Date	(Signa	1	000	98	1	2/2	2/28/09						T
		2				-	10						
Bey 0													
												ш	Page 3 of 3

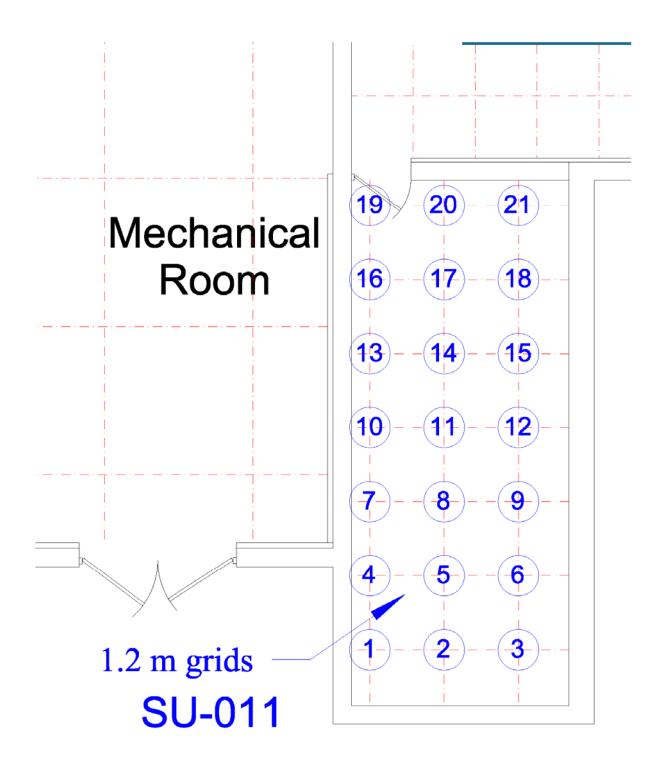


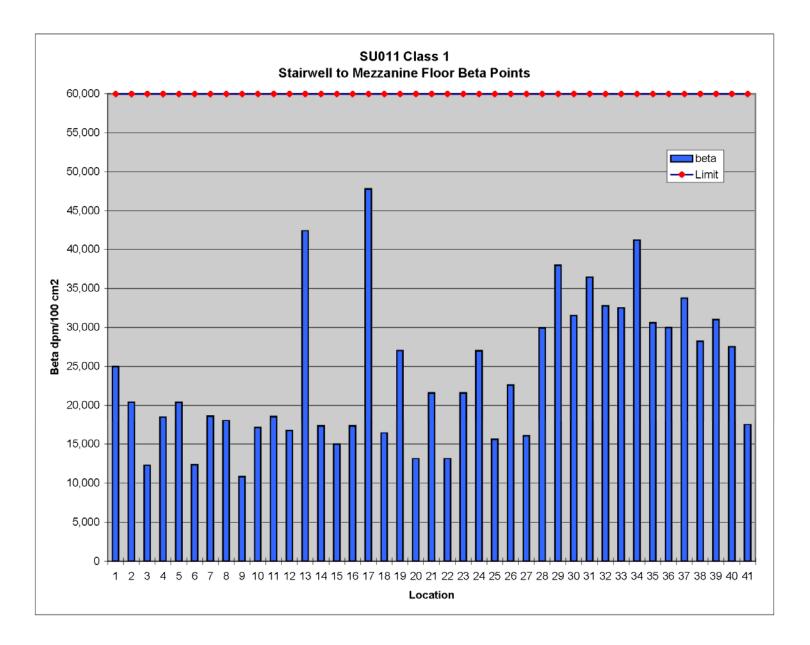
Figure 4-12 SU011 Survey Map

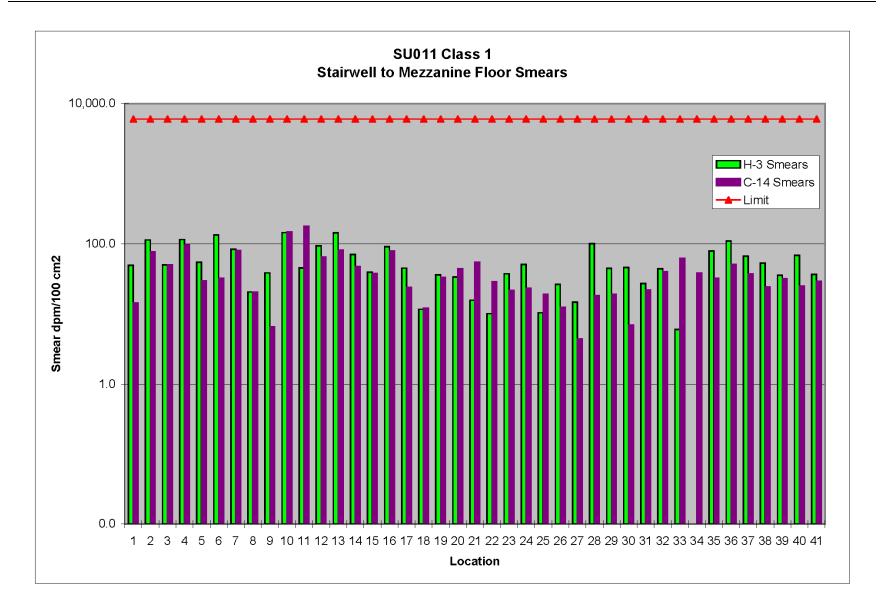
EaglePicher FSS Data Sheet Survey Unit 011 Stairwell to Mezzanine

Detector

Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	095523	126	9/30/10	2350-1	80502	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

			Ве	eta	H-	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	oc.*	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm <sup>2</sup> )	(dpm/100cm
1	1	Floor	24,975	60,000	49.6	6,000	14.3
2	2	Floor	20,395	60,000	113.5	6,000	76.4
3	3	Floor	12,260	60,000	50.1	6,000	49.9
4	4	Floor	18,472	60,000	115.2	6,000	97.0
5	5	Floor	20,383	60,000	54.5	6,000	29.6
6	6	Floor	12,353	60,000	134.1	6,000	32.1
7	7	Floor	18,612	60,000	83.9	6,000	80.2
8	8	Floor	18,017	60.000	20.6	6,000	20.5
9	9	Floor	10,838	60,000	38.5	6,000	6.6
10	10	Floor	17,097	60,000	144.8	6,000	148.7
11	11	Floor	18.553	60.000	45.4	6.000	177.0
12	12	Floor	16,712	60,000	93.3	6,000	64.6
13	13	Floor	42.375	60,000	143.9	6,000	81.2
14	14	Floor	17,295	60.000	70.5	6.000	47.7
15	15	Floor	14,952	60,000	39.5	6,000	38.0
16	16	Floor	17,295	60,000	91.4	6,000	79.1
17	17	Floor	47,817	60,000	45.1	6,000	23.8
18	18	Floor	16,409	60,000	11.7	6,000	12.2
19	19	Floor	27,026	60,000	36.0	6,000	33.4
20	20	Floor	13,123	60,000	33.5	6,000	44.2
21	21	Floor	21,584	60,000	15.7	6,000	54.8
22	22	Floor	13,123	60,000	10.1	6,000	29.0
23	23	Floor	21,584	60,000	37.4	6.000	21.8
24	24	Floor	26,979	60,000	50.7	6.000	23.3
25	25	Floor	15,558	60,000	10.4	6.000	19.2
26	26	Floor	22,597	60,000	26.4	6,000	12.5
27	27	Floor	16.013	60,000	14.7	6,000	4.4
28	28	Floor	29,916	60,000	100.5	6.000	18.2
29	29	Floor	37,969	60,000	44.6	6.000	19.0
30	30	Floor	31,513	60,000	45.8	6,000	6.9
31	31	Floor	36,419	60,000	27.2	6,000	22.0
32	32	Floor	32,760	60,000	44.2	6,000	40.1
33	33	Floor	32,480	60,000	6.0	6,000	62.3
34	34	Floor	41,174	60,000	0.0	6,000	38.1
35	35	Floor	30,569	60,000	79.2	6,000	32.5
36	36	Floor	29,963	60,000	109.9	6,000	51.0
37	37	Floor	33,739	60,000	66.9	6,000	37.2
38	38	Floor	28,203	60.000	53.0	6,000	24.4
39	39	Floor	31,000	60,000	35.6	6,000	32.1
40	40	Floor	27,492	60,000	68.4	6,000	25.1
40	41	Floor	17,470	60,000	36.8	6,000	29.1
Average	F F		23,977	00,000	56.1	0,000	42.9
		Floor					
Standard Deviation Maximum	F F	Floor Floor	9,242 47.817		38.5 144.8		35.7 177.0
Waximum   R = Roof, F = Floor, W					144.8		177.0







M2350-1 Download BETA Report

Survey Reason : Final Status	iption :SU11S Stairwell	
User ID : SXM1098	Technician Name : Sharon McChes	sney
Instrument Model : 2350-1	Instrument S/N : 80502	Instrument Cal. Due : 9/30/2010
Detector Model : 43-68b	Detector S/N: 095523	Detector Cal. Due : 9/30/2010
Measurement Type : BETA	Detector Type : 02200 : 126 cm2 G	as Proportional Detector
Detector Area : 126	Efficiency: 0.0681	Survey Date : 10/29/2009
Minimum Net DPM Observed: -1353	Mean Net DPM: 27306	
Maximum Net DPM Observed: 125807	STDEV Observed: 21803	# of Samples Taken: 52
Sharon McChesney Print Name	Moren Maleons	10-29-09 Date
Print Name	Signature	Date

Scan data	provided	in down	oad sile	4000 CPM.	pegly
					1
			410		

Sign-Off PAULELY Paul Ely 10/30/09
Print Name Y Paul Ely 10/30/09
Page 1 of 3

# Duratek Beta Survey Report

Download File Name: 00000042

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
ZZZZZ	27777	0	3,310.0	600	PRBBK	B9999	22272	1	0	3,858
<b>ZZZZZ</b>	ZZZZZ	1	3,879.0	60	PRSC1	B9999	22222	0	0	45,207
SU11S	F01	2	422.0	60	FLDBK	B9999	22272	1	447	-291
SU11S	F01	3	2,590.0	60	FLDCT	B9999	ZZZZZ	1.	447	24,975
SU11S	F01	4	2,197.0	60	FLDCT	B9999	22272	2	447	20,395
SU115	F01	5	1,499.0	60	FLDCT	B9999	77777	3	447	12,260
SU11S	F01	6	2,032.0	60	FLDGT	B9999	ZZZZZ	4	447	18,472
SU11S	F01	7	2,196.0	60	FLDCT	B9999	ZZZZZ	5	447	20,383
SUTIS	F01	8	1,507.0	60	FLDCT	B9999	22222	В	447	12,353
SU115	F01	9	2,044.0	60	FLDCT	B9999	27777	7	447	18,612
SU115	F01	10	1,993.0	60	FLOCT	B9999	ZZZZZ	8	447	18,017
SU115	F01	11	1,377.0	60	FLDCT	B9999	27272	9	447	10,838
SUIIS	F01	12	1,914.0	60	FLDCT	B9999	22222	10	447	17,097
SU115	F01	13	2,039.0	60	FLDCT	B9999	27777	44	447	18,553
SU115	F01	14	1,881.0	60	FLDCT	B9999	77777	12	447	16,712
SU115	F01	15	4,083.0	60	FLDCT	B9999	22222	13	447	42,375
U115	F01	16	6,378.0	60	FLDCT	89999	ZZZZZ	14	447	69.121 Pre de
U115	F01	17	1.730.0	60	FLOCT	B9999	22222	15	447	14,952
U11S	F01	18	2,267.0	60	FLDCT	B9999	22272	16	447	21,211
U115	F01	19	4,550.0	80	FLDCT	B9999	22222	17	447	47,817
SU11S	F01	20	1,855.0	60	FLDCT	B9999	ZZZZZ	18	447	16,409
U115	F01	21	7,114.0	60	FLOCT	B9999	ZZZZZ	19	447	77,699 Pce dec
U115	F01	22	6,937.0	60	FLOCT	89999	22222	20	447	75,636 Pre dec
UIIS	F01	23	11,242.0	60	FLDCT	B9999	ZZZZZ	21	447	125,807 Pre dec
SU11S	F01	24	1,849.0	60	FLDCT	B9999	77777	22	447	16,339
U115	F01	25	1,787.0	60	FLDCT	89999	27777	23	447	15,617
U11S	F01	26	2,762.0	60	FLDCT	B9999	22272	24	447	26,979
UIIS	FD1	27	440.0	60	FLDBK	B9999	22222	2	447	-82
U115	F01	28	1,782.0	60	FLDCT	B9999	22222	25	447	15,558
U115	F01	29	2,386.0	60	FLDCT	89999	ZZZZZ	26	447	22,597
U11S	F01	30	1,821.0	60	FLOCT	B9999	77777	27	447	16,013
U118	F01	31	3,014.0	80	FLDCT	B9999	ZZZZZ	28	447	29,918
U11S	F01	32	3,705.0	60	FLDCT	B9999	22722	29	447	37,969
U118	F01	33	3,151.0	60	FLDCT	B9999	ZZZZZ	30	447	31,513
U115	F01	34	3,572.0	60	FLDCT	B9999	77777	31	447	36,419
U11S	F01	35	3,258.0	80	FLDCT	B9999	22222	32	447	32,760
U11S	F01	36	3,234.0	60	FLDCT	B9999	27272	33	447	32,480
U11S	F01	37	3,980.0	60	FLDCT	B9999	ZZZZZ	34	447	41,174
U11S	F01	38	3,070.0	60	FLDCT	B9999	ZZZZZ	35	447	30,569
		E	Beta Flag			45000 -		Ī		
			eta Max			60000				

Friday, October 30, 2009

Page 2 of 3

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU11S	F01	39	3,018.0	60	FLDCT	B9999	ZZZZZ	36	447	29,963
SU11S	F01	40	3,342.0	60	FLDCT	B9999	ZZZZZ	37	447	33,739
SU11S	F01	41	2,867.0	60	FLDCT	B9999	ZZZZZ	38	447	28,203
SU11S	F01	42	3,107.0	60	FLDCT	B9999	ZZZZZ	39	447	31,000
SU11S	F01	43	2,806.0	60	FLDCT	B9999	22222	40	447	27,492
SU11S	F01	44	1,946.0	60	FLDCT	B9999	ZZZZZ	41	447	17,470
SU11S	F01	45	474.0	60	FLDBK	B9999	22222	3	447	315
SU11S	F01	46	1,931.0	60	PTDCN	B9999	22272	14	447	17.295
SUIIS	F01	47	2,766.0	60	PTDCN	B9999	77777	19	447	27,026
SU11S	FO1	48	1.573.0	60	PTDCN	B9999	77777	20	447	13,123
SU11S	F01	49	2,299.0	60	PTDCN	89999	77777	21	447	21,584
SU115	F01	50	3,309.0	600	PTBBK	B9999	22222	j	447	-1,353
SU11S	FO1	51	3,860.0	60	PTSC1	B9999	27777	1	447	39,776

	Beta Flag	45000	
	Beta Max Flag	60000	
Friday, October 30, 2009			Page 3 of 3

1

29 Dct 2009 10:28 ALPHA/BETA - 1.09 Page #1 Protocol #: 1 Smears H-3 & C-14 User : EaglePicher / ES Time: 1.00 Data Mode: Dual DPM Nuclides: 3H-14C Quench Sets Low Energy: 3H Background Subtract: 1st Vial High Energy: 140 25% 8.26 LL UL LCR 0 0.0 - 12.0 Region A: 0.0 Region B: 12.0 - 156 0 0.0 19.84

0.00

0

0.0

Quench Indicator: tSIE/AEC
Ext Std Terminator: Count
FSS Smears in 20 ml Ultima Gold
Coincidence Time(ns): 18
Delay Before Burst(ns): Normal

Region C: 0.0 - 0.0

Protocol Data Filename: C:\EP\PROT.DAT
Count Data Filename: C:\EP\SDATA11.004

P#PID S# SMPL\_ID TIME CPMAA: 25% CPMBB:25% 3H-DPM 14C-DPM tSIE FLAG 8.3 22.0 19.8 14.2 0.00 0.00 419 13.8 86.3 49.57 14.28 418 1 10.0 SU11 Floor#1 3 1 2 18.1 57.7 1.0 3 3 SU11 Floor#2 1.0 44.7 32.8 67.2 28.1 113.45 76.44 401 3 4 SU11 Floor#3 1.0 22.0 50.7 1 42.9 37.5 50.10 49.92 412 84.1 24.5 115.24 5 SU11 Floor#4 1.0 47.8 31.6 97.02 404 1.0 3 6 SU11 Floor#5 21.3 51.7 1 26.6 52.4 54.53 29.60 416 3 7 SU11 Floor#6 1.0 44.2 33.0 31.7 46.1 134.10 32.14 379 1.0 35.9 37.4 69.0 27.6 83.89 1 3 8 SU11 Floor#7 80.18 404 17.6 71.2 3 9 SU11 Floor#8 1.0 9.3 92.5 3 10 SU11 Floor#9 1.0 13.8 69.4 20.63 20.47 426 1 7.1 151 38.49 6.61 426 3 11 SU11 Floor#10 1.0 60.9 27.5 127.0 19.2 144.79 148.66 1 386 3 12 SU11 Floor#11 1.0 34.5 38.3 146.4 17.7 7 13 SU11 Floor#12 1.0 38.0 36.1 56.9 31.2 1 45.43 176.95 413 38.0 36.1 56.9 31.2 93.32 58.1 28.2 72.8 26.7 143.92 1.0 64.62 416 58.1 28.2 7 14 SU11 Floor#13 1.0 1 81.16 430 7 15 SU11 Floor#14 1.0 27.3 44.2 41.8 38.1 1 70.45 47.68 393 7 16 SU11 Floor#15 7 17 SU11 Floor#16 1.0 17.2 59.7 1 32.7 45.1 39.51 38.00 412 1 1.0 39.3 35.4 68.6 27.7 91.36 79.06 420 7 18 SU11 Floor#17 1.0 17.5 59.0 21.4 61.4 1 45.05 23.83 414 7 19 SU11 Floor#18 1.0 4.6 160 10.3 110 1 11.67 12.16 354 7 20 SU11 Floor#19 7 21 SU11 Floor#20 1.0 16.0 62.5 1.0 16.3 61.8 28.9 49.3 1 36.01 33.35 432 16.3 61.8 37.6 41.0 33.52 44.17 428 1.0 7 22 SU11 Floor#21 11.4 79.4 45.5 36.1 15.74 54.80 427 7 23 SU11 Floor#22 7 24 SU11 Floor#23 1.0 6.7 118 24.2 56.1 10.13 442 15.4 64.4 28.96 1.0 19.5 65.8 21.84 37.35 440 1 10 25 SU11 Floor#24 19.6 54.6 21.3 61.7 50.70 23.28 423 5.7 134 16.2 76.3 1 10 26 SU11 Floor#25 1.0 10.38 19.17 SU11 Floor#26 1.0 10.5 84.2 11.4 101 SU11 Floor#27 1.0 5.6 137 4.3 239 1 10 27 26.42 12.48 438 1 10 28 SU11 Floor#27 14.73 4.43 443 1.0 36.6 37.0 SU11 Floor#28 1 10 29 19.3 66.4 100.46 18.17 435 1 10 30 SU11 Floor#29 1.0 17.4 59.1 17.5 71.7 44.63 18.95 433 1 10 31 SU11 Floor#30 1.0 16.2 62.1 6.93 7.7 141 45.79 424 1 10 32 SU11 Floor#31 1.0 11.7 77.7 1 10 33 SU11 Floor#32 1.0 18.5 56.8 19.2 66.8 27.15 21.95 433 34.6 43.4 44.21 40.14 400 1 10 34 SU11 Floor#33 1.0 8.8 96.2 51.1 33.4 6.01 62.34 405 1 10 35 SU11 Floor#34 1.0 3.8 187 1 10 36 SU11 Floor#35 1.0 28.1 43.4 1 16 37 SU11 Floor#36 1.0 40.6 34.7 38.14 31.1 46.8 0.00 405 29.8 48.3 79.19 32.45 389 46.3 35.6 109.93 51.01 399

29 (	Oct	200	9 11	: 46	ALPHA	/BETA - 1.09			Pa	age #2	2
Prot	000	01 #	: 1		Smears	5 H-3 & C-14		User :	EaglePid	her /	ES
P#F	PID	S#		SMPL_ID	TIME	CPMAA: 25%	CPMBB: 25%	3H-DPM	14C-DPM	tSIE	FLAG
1	16	38	SU11	F100r#37	1.0	24.8 47.0	33.1 44.8	66.85	37.21	388	
1	16	39	SU11	Floor#38	1.0	18.9 56.0	22.0 60.1	53.01	24.35	383	
1	16	40	SU11	Floor#39	1.0	14.4 67.5	27.5 51.0	35.63	32.07	381	
1	16	41	SU11	Floor#40	1.0	22.7 49.6	23.2 57.9	68.42	25,12	365	
1	16	42	SU11	Floor#41	1.0	15.5 63.9	25.4 54.1	36.78	29.09	420	

# 4.3.12 SU012-West Hallway

The West Hallway floor had some areas in excess of limits (60,000 dpm/100 cm<sup>2</sup>). The remaining linoleum was removed and the floor cleaned. One small area on the floor still exceeded limits. The West Hallway floor was changed to a Class 1 area and resurveyed. In addition the painted block walls were also contaminated from the floor up to the ceiling. The walls and a part of the floor were removed as radioactive waste and not included in the Final Status Survey (FSS).

Summary results are provided in Table 4-15 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

Summary Survey Unit 012 West Hallway, Class 1	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm <sup>2</sup> )
Number	18	2	18	18
Average	5,163	18,204	13.3	12.5
Standard Deviation	4,181	N/A	20.9	14.9
Mayimum	15,645	20.764	62.5	46.5

**Table 4-15: SU012 Summary Results** 

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



### FSS Survey Package Worksheet for EaglePicher SU012

Package Identification No.: SU12F/SU12S	Prepared by: Paul C. Ely
Location: West Hallway	Date Prepared: 10/28/2009
Area Classification: Class 1	Signature: Paul Ely

### Area Description

The survey area includes the floors only.

### **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

### **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - $\epsilon_i$ ,  $2\pi$  instrument efficiency from calibration papers. If a  $4\pi$  efficiency is reported, calculate the  $2\pi$  efficiency as follows using a 5% beta Back Scatter factor (BS).  $\epsilon_i = (2 * \epsilon_{4\pi}) \setminus (1 + BS)$
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - $\epsilon_t$ , the total beta efficiency =  $\epsilon_i * \epsilon_s$
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 2,500 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 100% scan of floor for beta contamination.
- 3. Perform direct beta surface activity measurements at each measurement location. Mark the survey locations with a felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the survey unit. Systematic survey locations were generated for this class 1 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm² in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Survey Package Worksheet SU12F/SU12S (cont'd)

		Source check instrumentation	strument													
	Sourc The s 3,000 Perfor plasti Log s cpm o	The static MDC for total beta 3,000 dpm/100 cm². Perform a minimum of three oplastic shield on the survey su Log scan measurements or recom on a Grid Scan Record.	cm². mum of th n the surv vrements Scan Recc	E & 0 E 9	for beta neasure te field imum s	to C-14 for beta measurements. activity measurements shall be less than me-minute field backgrounds using the rface. ord maximum scan measurement results	nents. all be les neds usin rement	ss than ig the results in	• - •	Measure rectangu location coordina The attac	ment and lar patter to the ne tes for th	Measurement and sampling locativectangular pattern. If any location location to the nearest usable loca coordinates for the location used.  The attached map provides floor in the attached map provides floor in the attached map browides floor in the attached map browings.	g location location i ole locatio n used.	s are based is inaccessib on and docun asurement a	Measurement and sampling locations are based on a random-start rectangular pattern. If any location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.  The attached map provides floor measurement and sampling locations.	art easuremen y cations.
					Surv	Survey Performance (Initial and date as each item is completed)	тапсе	(Initial a	nd date	as each i	item is ca	ompleted	6			
	Lo	Location Codes	es	Constant	200	0	2	-					1		Smear	
	17	1.2	97	Description	Scan	Tech	Beta	Tech	Alpha	Survey	Scan	Survey	Direct	Survey	Gross (Liq. Scint.)	Survey
							Eagle	Picher S	U012 C	EaglePicher SU012 Class 1 Area	ea					
Pa	Package 1D	Surface or Structure	Material Code			Initial & Date	@60 sec	Initial & Date	3ec	Initial & Date		Initial & Date	@100 cm	Initial & Date	β	Initial & Date
SI	SU12F	F0001	B0012	Floor	N/A	A N	-61	KX 50	N/A	N/A	N/A	N/A	N/A	N/A	19	900
St	SU12S	F0001	B0012	Floor	100%	N.48-09	N/A	WAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
												I				
	-															

			Surv	Survey Performance (Initial and date as each item is completed)	mance	(Initial a	nd date	as each	item is co	ompleter	(1)			
Location Codes		General	_		Direct	Cuman	Direct	Common	_	0			Smear	
L1 L2	F6	Description	Scan	Tech	Beta	Tech	Alpha	Tech	Scan	Tech	Gamma	Tech	Gross (Liq. Scint.)	Survey
									L y					
						Survey	Survey Comments	ınts						
		0110				Packag	Package Review	*						
Surveyor(s) Signatures:	1	Leha K	3	0	Pu		1							
Date Package Completed:	ted:	11/02	100	1	5									
Package Review by and Date (Signature):	d Dat	(Signature):	1	one	0	R	12	1/29	109					
			5			1								
Rev. 0														Page 3 of 3
														0

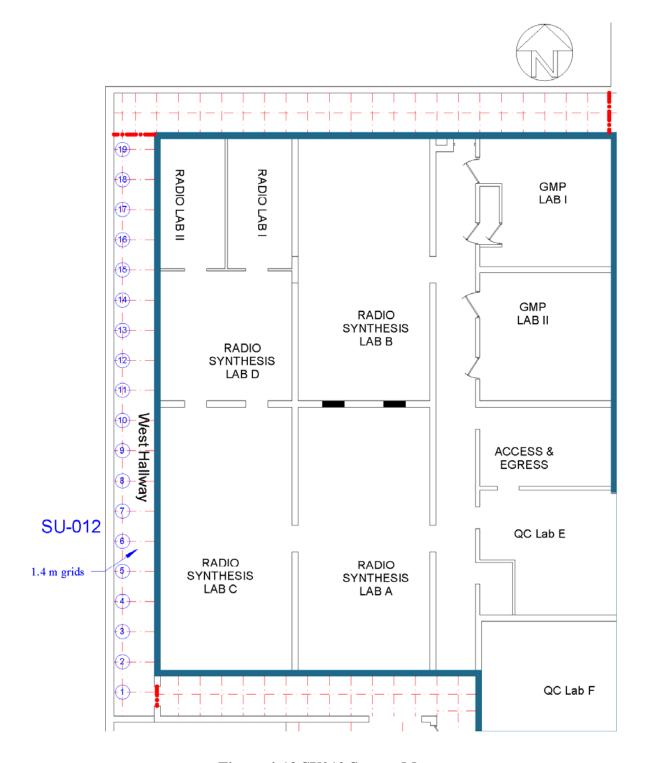


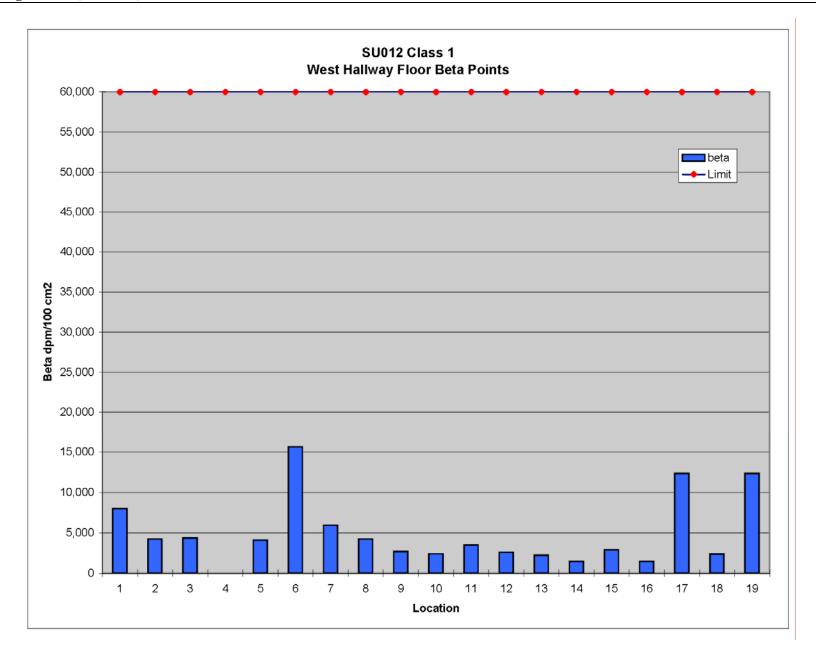
Figure 4-13 SU012 Survey Map

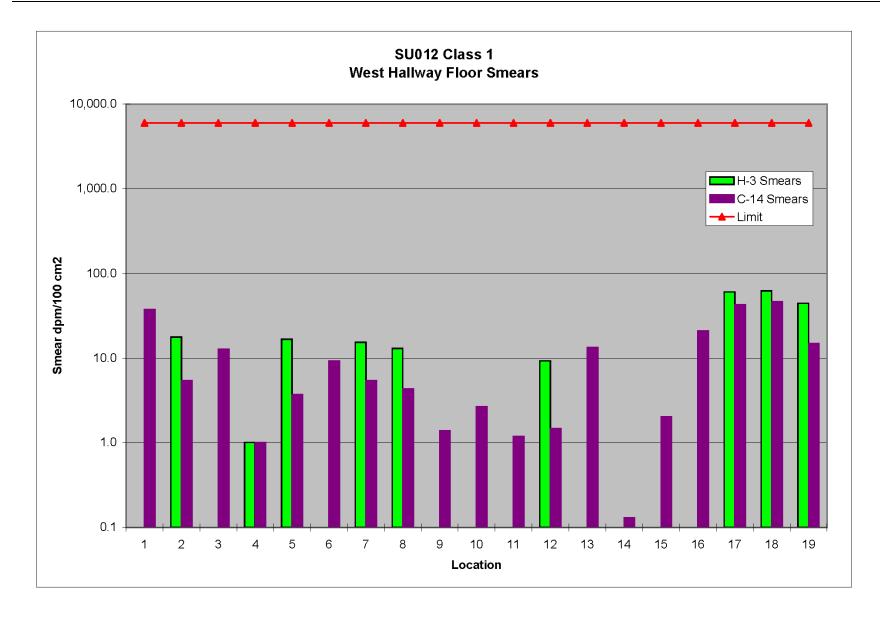
EaglePicher FSS Data Sheet Survey Unit 012 West Hallway

Detector
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Detector Type	Detector SN	(cm²)	Detector Cal Due	Meter Type	Meter SN	Meter Cal Due
Ludlum 43-68 (beta)	119337	126	9/30/10	2350-1	95359	9/30/10
Packard Tri-Carb B2555	401663	NA	Daily	NA	NA	NA

			Ве	eta	H-3	3	C-14
Survey			Fixed Reading	Limit	Smear	Limit	Smear
Point	Lo	c.*	(dpm/100cm <sup>2</sup> )				
1	F	Floor	7,996	60,000	0.0	6,000	37.5
2	F	Floor	4,239	60,000	17.7	6,000	5.4
3	F	Floor	4,349	60,000	0.0	6,000	12.8
4	F	Floor	To Radwaste	60,000	To Radwaste	6,000	To Radwaste
5	F	Floor	4,104	60,000	16.8	6,000	3.7
6	F	Floor	15,645	60,000	0.0	6,000	9.3
7	F	Floor	5,957	60,000	15.4	6,000	5.4
8	F	Floor	4,231	60,000	13.0	6,000	4.3
9	F	Floor	2,682	60,000	0.0	6,000	1.4
10	F	Floor	2,411	60,000	0.0	6,000	2.6
11	F	Floor	3,511	60,000	0.0	6,000	1.2
12	F	Floor	2,614	60,000	9.3	6,000	1.5
13	F	Floor	2,225	60,000	0.0	6,000	13.3
14	F	Floor	1,489	60,000	0.0	6,000	0.1
15	F	Floor	2,877	60,000	0.0	6,000	2.0
16	F	Floor	1,481	60,000	0.0	6,000	20.9
17	F	Floor	12,362	60,000	60.4	6,000	42.7
18	F	Floor	2,394	60,000	62.5	6,000	46.5
19	F	Floor	12,362	60,000	44.4	6,000	14.8
Average		Floor	5,163		13.3		12.5
Standard Deviation		Floor	4,181		20.9		14.9
Maximum		Floor	15,645	·	62.5		46.5
* R = Roof, F = Floor, W	= Wall, C = Ce	iling, E = Equi	oment		•		







M2350-1 Download BETA Report

File Name : 00000039	Survey Descri	ption :SU12 Points on floor 1-18	
Survey Reason : Final Sta	atus		
User ID : RPS2366		Technician Name : Richard Stone	ey
Instrument Model : 2350	)-1	Instrument S/N : 95359	Instrument Cal. Due : 9/30/2010
Detector Model : 43-6	8b	Detector S/N: 119337	Detector Cal. Due 9/30/2010
Measurement Type : BET.	A	Detector Type: 02200: 126 cm2	Gas Proportional Detector
Detector Area : 126		Efficiency: 0.0938	Survey Date : 10/28/2009
Minimum Net DPM Obser	ved: -1593	Mean Net DPM: 19271	
Maximum Net DPM Obser	rved: 261059	STDEV Observed: 53209	# of Samples Taken: 25
Richard : Print N		Richal P.S.	10-28-2009 Date
Print N	ame	Signature	Date

Acer	d off 5.7 Marbid w	e as rai	dioactive	waste. PER 10/30/1 equivalent und) = 3,45H CP.
245HC 245HC	dpm/100 cm2,	3,000 - 546 Pm/dpm (EST)	( pm ( koc legge 1 (mg) + 126	int x 100 cm2 =

Sign-Off PAIL Exy Paul Ele 10/30/09
Print Name y Paul Ele 10/30/09
Page 1 of 7

# Duratek Beta Survey Report

Download	File Name:	00000039
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Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)	(*)
SU12	FL01	0	542.0	60	FLDBK	B0002	ZZZZZ	0	546	-34	
SU12	FL01	1	1,491.0	60	FLDCT	B0002	ZZZZZ	1	546	7,996	
SU12	FL01	2	1.047.0	60	FLDCT	B0002	77777	2	546	4,239	
SU12	FL01	3	1,060.0	60	FLDCT	B0002	27272	3	546	4,349	
SU12	FL01	4	31,400.0	60	FLDCT	B0002	ZZZZZ	4	546	261.059	Descry
SU12	FL01	5	1,031.0	60	FLOCT	B0002	22222	5	546	4,104	
SU12	FLD1	6	2,395.0	60	FLDCT	80002	ZZZZZ	6	546	15,645	
SU12	FL01	7	1,250.0	60	FLDCT	80002	ZZZZZ	7	546	5,957	
SU12	FL01	В	1,046.0	60	FLDCT	B0002	27772	8	546	4,231	
SU12.	FL01	9	863.0	60	FLDCT	80002	77777	9	546	2,682	
SU12	FL01	10	831.0	60	FLDCT	B0002	27777	10	546	2,411	
SU12	FL01	11	961.0	60	FLDCT	B0002	22222	-11	546	3,511	
SU12	FL01	12	855.0	60	FLDCT	B0002	ZZZZZ	12	546	2,614	
SU12	FL01	13	809.0	60	FLDCT	B0002	ZZZZZ	13	546	2,225	
SU12	FL01	14	722.0	60	FLDCT	B0002	22777	14	546	1,489	
SU12	FL01	15	886.0	60	FLDCT	80002	ZZZZZ	15	546	2,877	
SU12	FL01	16	721.0	60	FLDGT	80002	ZZZZZ	16	546	1,481	
SU12	FL01	17	3,943.0	60	FLDCT	80002	77777	_12_	546		Decon
SU12	FL01	18	829.0	60	FLDCT	80002	22222	18	546		
SU12	FL01	19	2,007.0	60	FLDCT	B0002	22222	(7)	546	12.362 V	eccutatete decod
SU12	FL01	20	541.0	60	FLDBK	B0002	ZZZZZ	17	546	-42	deced
SU12	FL01	21	10,172.0	60	FLDCT	B0002	ZZZZZ	4	546	81,447	recountables
SU12	FL01	22	555,0	60	FLDBK	B0002	22272	4	546	76	decive. Hory
SU12	FL01	23	3,577.0	600	РТВВК	B0002	227.22	0	546	-1.593	Chithis area
SU12	FL01	24	4,275.0	60	PTSC1	B0002	77777	۵	546	31,551	Att adwarte
											Petrodoverte

Beta Flag 45000 -\_\_\_\_\_

Beta Max Flag 60000

Wednesday, October 28, 2009

Page \_\_\_ of \_\_\_

	DV.	200	9 10:	24		the second secon	And the second second	- 1.09					age #	
Prot	000	1 #	: 1			Smear	5 H-3	& C-14			User :	EaglePi	cher .	/ ES
Time	:	1.	00											
ata	Mod	de:	Dual	DPM	1		Nuc1	ides:	3H-14C			h Sets w Energy	: 3H	
ack	grau	und	Subtr	act	: 1st	Vial						gh Energy		
			LL		UL	LCR	25%		BKG			-17		
eai	on A	: 6	0.0	) -	12.0	0	0.0	13	.11		Sui	017		
eai	on I	B:	12.0	) -	156	0	0.0	18	.89					
eqi	on (	:	0.0	) –	0.0	0	0.0	0	.00					
uen	ch :	Ind	icator	-: t	SIE/AE	C								
E	xt S	Std	Termi	nat	or: Co	unt								
SS	Smea	ars	in 20	m1	Ultim	a Gold								
			e Time											
			re Bur											
rot	000	I D	ata Fi	len	ame: D	: LEP P	ROT. DA	T						
oun	t Da	ata	Filer	ame	: C:/E	PISDATA	41.001							
P#P	ID S	5#		SM	PL_ID	TIME	CPMA	A:25%	СРМВ	B:25%	3H-DPM	14C-DPM	tSIE	FL
		5#		SM	PL_ID	TIME 10.0		A:25% 17.5		B:25% 14.6	3H-DPM 0.00	14C-DPM 0.00	tSIE 429	FL
1		1	SU012				13.1		18.9			0.00	429	FLI
1	2 2 2	1 2 3	SU012	FI	oor_1	10.0	13.1	17.5	18.9	14.6	0.00	0.00	429 435	FLI
1 1 1	2 2 2 2	1 2 3	SU012	F1	oar_1	10.0	0.0 6.8	17.5	18.9 30.1 5.2	14.6 47.4 195	0.00	0.00 37.46 5.43	429 435	FLI
1	22220	1 2 3	SU012	F1 F1	oar_1 oor_2 oor_3	10.0	0.0 6.8	17.5 0.0 136 0.0	18.9 30.1 5.2 10.3	14.6 47.4 195	0.00 0.00 17,72	0.00 37.46 5.43	429 435 443 441	FLI
1 1 1 1 1	MUNNAMM	1234	SU012	F1 F1 F1	oar_1 oor_2 oor_3	10.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4	17.5 0.0 136 0.0	18.9 30.1 5.2 10.3 6.6	14.6 47.4 195 109	0.00 0.00 17,72 0.00	0.00 37.46 5.43 12.75 7.79	429 435 443 441 443	FLI
1 1 1 1 1 1 1 1	NUMBERN	12345	SU012 SU012 SU012 SU012	F1 F1 F1 F1	oar_1 oor_2 oor_3	10.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2	17.5 0.0 136 0.0 338	18.9 30.1 5.2 10.3 6.6 3.8	14.6 47.4 195 109 159	0.00 0.00 17,72 0.00 4.48	0.00 37.46 5.43 12.75 7.79	429 435 443 441 443 438	FLI
1 1 1 1 1 1 1 1 1	NENEMENN	12345678	SU012 SU012 SU012 SU012 SU012 SU012	F1 F1 F1 F1 F1	oar_1 oor_2 oor_3 oor_4 oor_5 oor_6	10.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0	17.5 0.0 136 0.0 338 146	18.9 30.1 5.2 10.3 6.6 3.8 7.5	14.6 47.4 195 109 159 261 143	0.00 0.00 17,72 0.00 4.48 16.75	0.00 37.46 5.43 12.75 7.79 3.73 9.26	429 435 443 441 443 438 446	FL
1 1 1 1 1 1 1 1	NANGERNA	123456789	SU012 SU012 SU012 SU012 SU012	F1 F1 F1 F1 F1	oar_1 oor_2 oor_3 oor_4 oor_5 oor_6	10.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9	17.5 0.0 136 0.0 338 146 0.0	18.9 30.1 5.2 10.3 6.6 3.8 7.5 5.1	14.6 47.4 195 109 159 261 143	0.00 0.00 17.72 0.00 4.48 16.75 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26	429 435 443 441 443 438 446 437	FLI
1 1 1 1 1 1 1 1 1	NENEMENN	123456789	SU012 SU012 SU012 SU012 SU012 SU012	F1: F1: F1: F1: F1: F1:	oar_1 oor_2 oor_3 oor_4 oor_5 oor_6 oor_7	10.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9	17.5 0.0 136 0.0 338 146 0.0 153 180	18.9 30.1 5.2 10.3 4.6 3.8 7.5 5.1 4.1	14.6 47.4 195 109 159 261 143 199	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41	429 435 443 441 443 438 446 437 426	FL
1 1 1 1 1 1 1 1 1	NANKANNAN	1234567890	SU012 SU012 SU012 SU012 SU012 SU012 SU012	F1: F1: F1: F1: F1: F1:	oar_1 oor_2 oor_4 oor_5 oor_6 oor_7 oor_8 oor_9	10.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 4.9	17.5 0.0 136 0.0 338 146 0.0 153 180	18.9 30.1 5.2 10.3 6.6 3.8 7.5 5.1 4.1	14.6 47.4 195 109 159 261 143 199 243	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32	429 435 443 441 443 438 446 437 426	FLI
1 1 1 1 1 1 1 1 1	222222222222222222222222222222222222222	12345678901	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F1:	oor_1 oor_2 oor_3 oor_4 oor_5 oor_6 oor_7 oor_8 oor_9 or_10	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 4.9 0.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0	18.9 30.1 5.2 10.3 4.6 3.8 7.5 5.1 4.1 1.1 2.1	14.6 47.4 195 109 159 261 143 199 243 845	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38	429 435 443 441 443 438 446 437 426 433 440	FLI
1 1 1 1 1 1 1 1 1 1 1 1	222222222222	123456789012	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F1 F	oor_1 oor_2 oor_3 oor_4 oor_5 oor_6 oor_7 oor_8 oor_9 or_10 or_11	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 4.9 0.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0 0.0 ****	18.9 30.1 5.2 10.3 4.6 3.8 7.5 5.1 4.1 1.1 2.1	14.6 47.4 195 109 159 261 143 199 243 845 454 977	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38 2.62	429 435 443 441 443 438 446 437 426 433 440 410	FL
1 1 1 1 1 1 1 1 1 1 1	222222222222222222222222222222222222222	1234567890123	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F1 F	oar_1 oor_2 oor_3 oor_4 oor_5 oor_5 oor_7 oor_7 oor_9 or_10 or_11 or_12	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 4.9 0.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0 0.0 ****	18.9 30.1 5.2 10.3 6.6 3.8 7.5 5.1 4.1 1.1 2.1 1.0	14.6 47.4 195 109 159 261 143 199 243 845 454 977	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38 2.62 1.18	429 435 443 441 443 438 446 437 426 433 440 410	FLI
1 1 1 1 1 1 1 1 1 1 1 1 1	222222222222222222222222222222222222222	12345678901234	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F1 F	00r_1 00r_2 00r_3 00r_4 00r_5 00r_6 00r_7 00r_7 00r_10 0r_11	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 0.0 0.0 0.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0 0.0 ****	18.9 30.1 5.2 10.3 6.6 3.8 7.5 5.1 4.1 1.1 1.0 1.6	14.6 47.4 195 109 159 261 143 199 243 845 454 977 588	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00 0.00 9.31	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38 2.62 1.18 1.46	429 435 443 441 443 438 446 437 426 430 410 441 439	FLI
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	222222222222222222222222222222222222222	123456789012345	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F1 F	00r_1 00r_2 00r_3 00r_4 00r_5 00r_6 00r_7 00r_7 00r_10 0r_11 0r_12	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 4.9 0.0 0.0 3.4 0.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0 0.0 ****	18.9 30.1 5.2 10.3 6.6 3.8 7.5 5.1 4.1 1.1 1.0 1.6	14.6 47.4 195 109 159 261 143 199 243 845 454 977 588 105 8521	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00 0.00 9.31 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38 2.62 1.18 1.46 13.30 0.13	429 435 443 441 443 438 446 437 426 430 440 441 439 427	FLI
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	222222233333333333333333333333333333333	1234567890123456	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F1 F	oar_1 oor_2 oor_3 oor_4 oor_5 oor_6 oor_7 oor_9 or_10 or_12 or_13 or_14 or_15	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 4.9 0.0 0.0 3.4 0.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0 0.0 **** 249 0.0	18.9 30.1 5.2 10.3 6.6 3.8 7.5 5.1 4.1 1.1 2.1 0.6 10.7 0.1	14.6 47.4 195 109 159 261 143 199 243 845 454 977 588 105 8521	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00 0.00 9.31 0.00 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38 2.62 1.18 1.46 13.30 0.13 2.00	429 435 443 441 443 438 446 437 426 433 440 410 439 427 426	FLI
1 1 1 1 1 1 1 1 1 1 1 1	222222222222222222222222222222222222222	12345678901234567	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F10 F100 F100 F100 F100 F100 F100 F100	00r_1 00r_2 00r_3 00r_5 00r_5 00r_7 00r_10 0r_11 0r_12 0r_14 0r_15	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.0 5.9 4.9 0.0 0.0 3.4 0.0 0.0 0.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0 0.0 **** 249 0.0 0.0 719	18.9 30.1 5.2 10.3 6.6 3.8 7.5 4.1 1.1 2.1 1.0 1.6 10.7 1.6 10.9	14.6 47.4 195 109 159 243 199 243 845 454 977 588 105 8521 591 72.6	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00 0.00 9.31 0.00 0.00 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38 2.62 1.18 1.46 13.30 0.13 2.00 20.87	429 435 443 441 443 426 433 440 410 441 437 426 430	FLI
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	123456789012345678	SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012 SU012	F10	00r_1 00r_2 00r_3 00r_5 00r_5 00r_7 00r_10 0r_11 0r_12 0r_13 0r_14 0r_14	10.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	13.1 0.0 6.8 0.0 2.4 6.2 0.9 4.9 0.0 0.0 3.4 0.0 0.0 0.0 1.1 2.0	17.5 0.0 136 0.0 338 146 0.0 153 180 0.0 0.0 **** 249 0.0 0.0 719	18.9 30.1 5.2 10.3 6.6 7.5 1.1 1.1 2.1 1.0 1.6 10.7 0.1 1.6 16.9 37.0	14.6 47.4 195 109 159 261 143 199 243 845 454 977 588 105 8521 591 72.6	0.00 0.00 17,72 0.00 4.48 16.75 0.00 15.35 13.04 0.00 0.00 9.31 0.00 0.00	0.00 37.46 5.43 12.75 7.79 3.73 9.26 5.41 4.32 1.38 2.62 1.18 1.46 13.30 0.13 2.00 20.87 42.72	429 435 441 443 438 446 437 426 433 440 410 441 439 427 430 359	FLI

# 4.3.13 SU013-Mezzanine Walls

This area was not initially part of a survey unit and before generating a survey package the walls were scanned for beta activity. The Mezzanine walls had uniform elevated activity, but less than the release limit. An initial scan revealed uniform activity from the bare concrete blocks, but the activity was not elevated on drywall, steel beams, ducts, and horizontal surfaces in the area. This is not a normal airborne contamination scenario as it did not result from contaminated dust or fume deposition because it only affected the bare concrete block.

Bare concrete block in the receiving area at the south east corner of the building was surveyed to see if had elevated activity levels. This block was well away from radioactive material work areas and the activity was only slightly elevated. The average activity on the bare block in the receiving area was 805 cpm/126 cm<sup>2</sup> as compared to the normal instrument background activity of approximately 400 cpm/126 cm<sup>2</sup>. The bare block background count rate was used for the mezzanine wall activity calculations.

A radon assessment was also performed on the mezzanine bare block. This was performed by surveying a small block area, covering the block with plastic overnight (to allow radon decay and to prevent recontamination) and resurveying the block. There was no reduction in the measured activity so radon was not the problem.

The source of the elevated activity was not determined, but the mezzanine wall block did not exceed release limits so no further investigation was performed. The mezzanine walls were then surveyed as a Class 2 survey unit.

Summary results are provided in Table 4-16 which is followed by the survey package, a survey map, survey data sheets, charts presenting the survey data, instrument download reports and the smear results from the Packard Tri-Carb Liquid Scintillation counter.

Summary Survey Unit 013 Mezzanine Walls, Class 2	Beta Fixed Reading (dpm/100cm²)	Beta Scan Maximums (dpm/100cm²)	H-3 Smear (dpm/100cm <sup>2</sup> )	C-14 Smear (dpm/100cm <sup>2</sup> )
Number	30	2	30	30
Average	19,252	40,043	21.9	32.9
Standard Deviation	12,374	N/A	23.6	21.5
Maximum	35,566	44,521	114.8	96.5

**Table 4-16: SU013 Summary Results** 

<sup>\*</sup>Beta scan maximum results include maximum data from fixed readings.



### FSS Survey Package Worksheet for EaglePicher SU013

Package Identification No.: SU13F/SU13S	Prepared by: Paul C. Ely
Location: Mezzanine Walls	Date Prepared: 10/30/2009
Area Classification: Class 2	Signature: Paul Elg

# Area Description

The survey area includes the walls only.

# **Historical Information**

Since May 13, 1985, this facility has been performing custom synthesis of tritium and C-14 radio-labeled organic compounds at the EaglePicher site. The isotopes of concern are C-14 and H-3.

# **General Survey Instructions**

- Use gas proportional detector model numbers 43-68, or equivalent detector as approved by the ES PM for beta surface activity surveys. The total instrument efficiency should use the following factors:
  - ε<sub>i</sub>, 2π instrument efficiency from calibration papers. If a 4π efficiency is reported, calculate the 2π efficiency as follows using a 5% beta Back Scatter factor (BS). ε<sub>i</sub> = (2 \* ε<sub>4π</sub>) \ (1 + BS)
  - ε<sub>s</sub>, the beta surface efficiency is 25%.
  - ε<sub>i</sub>, the total beta efficiency = ε<sub>i</sub> \* ε<sub>s</sub>
- Perform surface scans at a scan speed of 1 probe width per second or less for the 43-68. Any locations that exceed 4,000 cpm beta above background should be marked with a felt tip pen or equivalent and the extent of the elevated area recorded.
  - 25% scan of walls for beta contamination.
- Perform direct beta surface activity measurements at each measurement location. Mark the survey locations with a
  felt tip pen or equivalent. All surveys locations are referenced from the southwest corner of the survey unit.
  Systematic survey locations were generated for this class 1 survey unit.
- Collect a removable surface activity sample (smear) over an area of 100 cm<sup>2</sup> in size at each measurement location provided on survey maps and place the smear in a liquid scintillation vial immediately after it was taken.

Page 2 of 3

# Survey Package Worksheet SU13F/SU13S (cont'd)

1	4		netenmont			paniosom v										
	Sour The 3,000 Perfe plast 804 ( Log : cpm	Source check instrumentation The static MDC for total beta 3,000 dpm/100 cm². Perform a minimum of three o plastic shield on the survey sus 804 cpm/100cm² will be used Log scan measurements or rec cpm on a Grid Scan Record.	C for total ) cm². imum of th on the surv m² will be urements of Scan Reco	6 d a 0 a a	for bet measun inte fielc mater rete blk imum s	activity measurements shall be less than activity measurements shall be less than ne-minute field backgrounds using the rface. A material specific background of for concrete block walls.  ord maximum scan measurement results	all be le innds usi condense.	ss than ng the ound of results i	.5	Meass rectan locatic coordi The at	rement an gular patto on to the n mates for i	Measurement and sampling locat rectangular pattern. If any location location to the nearest usable loc coordinates for the location used. The attached map provides wall I	ng location y location ible location in used. is wall med	is are based is inaccessil and docu	Measurement and sampling locations are based on a random-start rectangular pattern. If any location is inaccessible, offset the measurement location to the nearest usable location and document the x and y coordinates for the location used.  The attached map provides wall measurement and sampling locations.	tart measuremen l y ccations.
					Sur	vey Perfo	rmance	(Initial	and dat	e as eac	h item is	Survey Performance (Initial and date as each item is completed)	G)			
	2	Location Codes	les			-		-	-	-	-	-			Smear	
100	3	1.2	1.6	Description	Scan	Survey	Direct	Survey	Alpha	t Survey a Tech	y Alpha	Survey	Direct Gamma	Survey Tech	Gross (Liq. Scint.)	Survey
							Eagl	EaglePicher SU013 Class 2 Area	SU013	Class 2	Area					
Pa	Package ID	Surface or Structure	Material Code			Initial & Date	39sc sec	Initial & Date	@60 sec	Initial & Date		Initial & Date	@100 cm	Initial & Date	в	Initial & Date
SI	SUI3F	F0001	B0005	Drywali	N/A	Whe	9	10.36-09	A/N F	N/A	N/A	N/A	N/A	N/A	9	500
SI	SUI3S	F0001	B0005	Drywall	25%	\$0-23-09	N/A	NIAPE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
S	SUI3F	F0001	B0006	Block Wall	N/A	NA pue	24	10-36-09	N/A	N/A	N/A	N/A	N/A	N/A	24	10-30-00
SI	SUI3S	F0001	B0006	Block Wall	25%	16.3.00	N/A	MAKE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
												_				

		Surv	Survey Performance (Initial and date as each item is completed)	rmance	(Initial a	nd date	Performance (Initial and date as each item is c	tem is co	ompleted				
Location Codes												Smear	
L) L2 L6	Description	Scan	Survey Tech	Direct Beta	Survey Tech	Direct Alpha	Survey	Alpha Scan	Survey Tech	Direct Gamma	Survey Tech	Gross (Liq. Scint.)	Survey Tech
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Surveyor(s) Signatures:	7 m/	}		6	Shew M. Cherry	NG	90	C	13				
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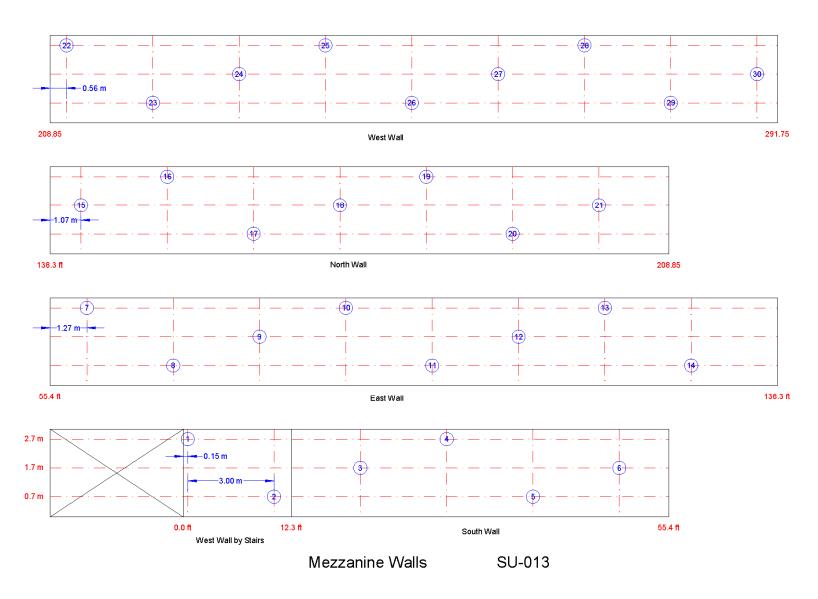
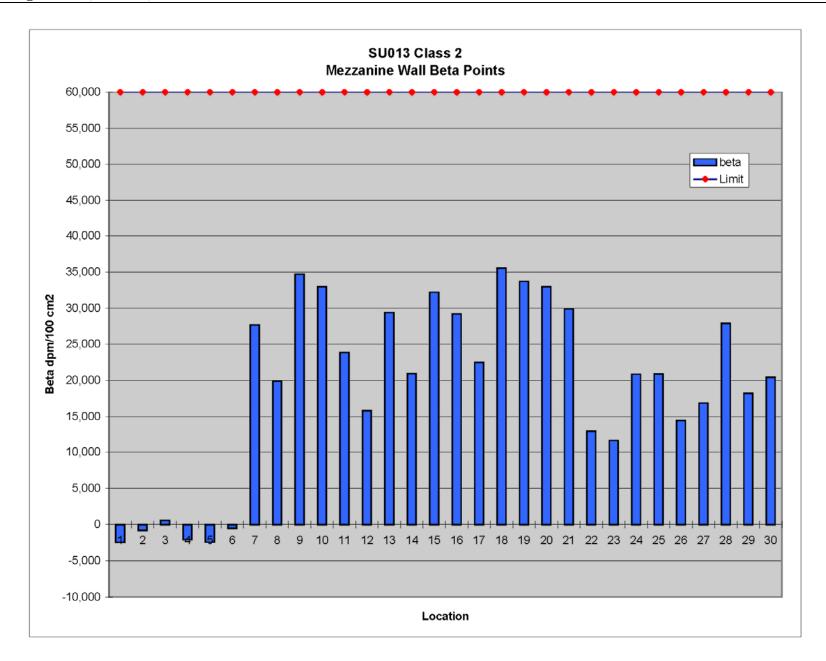
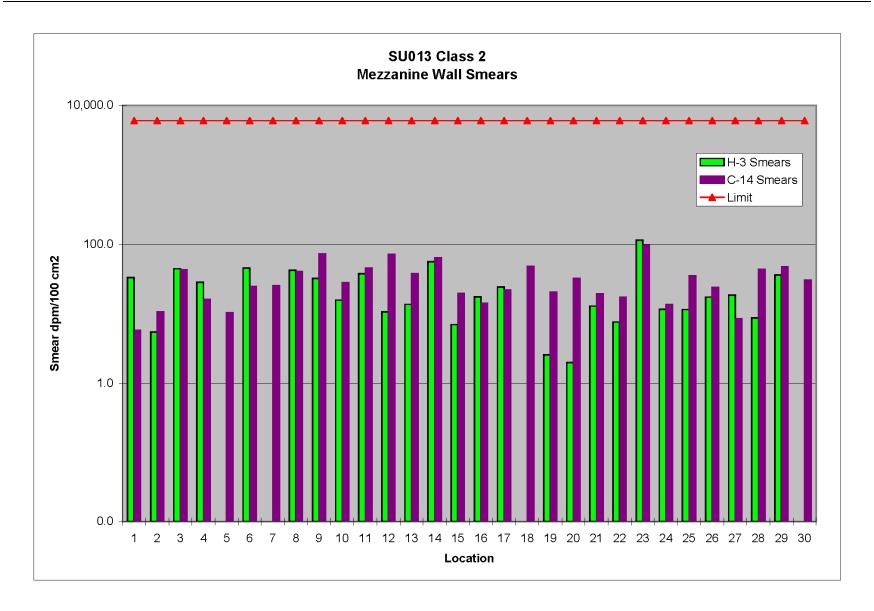


Figure 4-14 SU013 Survey Map

EaglePicher FSS Data Sheet Survey Unit 013 Mezzanine Walls Background on Block: 4,496  $dpm/100 cm^2$ 804.8 cpm/126 cm<sup>2</sup> Detector Detector Type Ludlum 43-68 (beta) Ludlum 43-68 (beta) Packard Tri-Carb B2555 Meter Cal Due 9/28/10 9/28/10 9/30/10 Meter SN 117566 Detector SN 091028 119337 (cm²) Meter Type 126 126 NA 2350-1 2350-1 NA 9/30/10 NA 95359 401663 Daily NA

Survey Point	İ		Beta		H-3		C-14
	Loc.*		Fixed Reading (dpm/100cm <sup>2</sup> )	Limit (dpm/100cm <sup>2</sup> )	Smear (dpm/100cm <sup>2</sup> )	Limit (dpm/100cm <sup>2</sup> )	Smear (dpm/100cm <sup>2</sup> )
2	W	Wall	-795	60,000	5.4	6,000	10.7
3	W	Wall	550	60,000	44.3	6,000	42.9
4	W	Wall	-2,090	60,000	28.5	6,000	16.0
5	W	Wall	-2,428	60,000	0.0	6,000	10.4
6	W	Wall	-508	60,000	45.2	6,000	24.5
7	W	Wall	27,661	60,000	0.0	6,000	25.5
8	W	Wall	19,905	60,000	42.4	6,000	40.7
9	W	Wall	34,674	60,000	32.2	6,000	73.1
10	W	Wall	32,987	60,000	15.7	6,000	27.9
11	W	Wall	23,831	60,000	37.9	6,000	45.7
12	W	Wall	15,799	60,000	10.7	6,000	71.2
13	W	Wall	29,412	60,000	13.6	6,000	37.5
14	W	Wall	20,924	60,000	56.3	6,000	63.7
15	W	Wall	32,202	60,000	7.0	6,000	19.7
16	W	Wall	29,231	60,000	17.5	6,000	14.1
17	W	Wall	22,462	60,000	24.3	6,000	22.1
18	W	Wall	35,566	60,000	0.0	6,000	48.3
19	W	Wall	33,698	60,000	2.6	6,000	20.5
20	W	Wall	32,997	60,000	2.0	6,000	32.5
21	W	Wall	29,889	60,000	12.9	6,000	19.4
22	W	Wall	12,937	60,000	7.6	6,000	17.3
23	W	Wall	11,600	60,000	114.8	6,000	96.5
24	W	Wall	20,857	60,000	11.6	6,000	13.5
25	W	Wall	20.890	60,000	11.5	6.000	35.0
26	W	Wall	14,426	60,000	17.3	6,000	23.9
27	W	Wall	16,863	60,000	18.4	6,000	8.4
28	W	Wall	27,888	60,000	8.7	6,000	43.7
29	W	Wall	18,200	60,000	36.2	6,000	47.5
30	W	Wall	20,417	60,000	0.0	6,000	30.3
Average	F	Floor	19,252	,	21.9	<i>'</i>	32.9
Standard Deviation	F	Floor	12,374		23.6		21.5
Maximum	F	Floor	35,566		114.8		96.5







M2350-1 Download BETA Report

Survey Reason : Other (explain) Backg	round Study				
User ID : SXM1098	Technician Name : Sharon McChesney				
Instrument Model : 2350-1	Instrument S/N : 80502	Instrument Cal. Due : 9/30/2010			
Detector Model : 43-68b	Detector S/N: 095523	Detector Cal. Due : 9/30/2010			
Measurement Type : BETA	Detector Type: 02200: 126 cm2 Gas Proportional Detector				
Detector Area ; 126	Efficiency: 0.0681 Survey Date: 10/29/2009				
Minimum Net DPM Observed: -315	Mean Net DPM: 3390				
Maximum Net DPM Observed: 6223	STDEV Observed: 2135	# of Samples Taken: 14			

Sharon McChesney	Shaw Mahoney	10-29-09	
Print Name	Signature	Date	
Print Name	Signature	Date	-

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Print Name Y Paul Ely 10/30/09
Page 1 of 2

# Duratek Beta Survey Report

Download File Name: 00000044

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
77777	ZZZZZ	0	634.0	60	BSTDY	B9999	77777	4	419	2,506
ZZZZZ	ZZZZZ	2	651.0	60	BSTDY	B9999	77777	1	419	2,704
22222	ZZZZZ	3	658.0	60	BSTDY	B9999	27277	2	419	2,704
77777	22222	4	894.0	60	BSTDY	B9999	ZZZZZ	3	419	5.536
22222	22722	5	850.0	60	BSTDY	B9999	22222	4	419	5,023
22272	22722	6	778.0	50	BSTDY	B9999	22222	5	419	
ZZZZZ	72777	7	804.0	60	BSTDY	89999	27777	6	419	4,184
22222	ZZZZZ	8	781.0	60	BSTDY	B9999	22222	7	419	4,487
22272	27777	9	831.0	80	BSTDY	89999	22772	В		3,986
27777	ZZZZZ	10	868.0	80	BSTDY	89999	77777		419	4,802
77777	27722	11	953.0	60	ESTDY	B9999	77777	10	419	5,233 6,223

 Beta Flag
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 Beta Max Flag
 60000 \_\_\_\_\_

Thursday, October 29, 2009

Page 2 of 2

Print Name



M2350-1 Download BETA Report

	ription :SU13F Walls Points 7-21				
Survey Reason : Final Status					
User ID : RLS2098	Technician Name : Lee Severtso	n.			
Instrument Model : 2350-1	Instrument S/N : 117566	Instrument Cal. Due : 9/28/2010			
Detector Model : 43-68b	Detector S/N: 091028	Detector Cal. Due : 9/28/2010			
Measurement Type : BETA	Detector Type: 02200: 126 cm2 Gas Proportional Detector				
Detector Area : 126	Efficiency : 0.0748 Survey Date : 10/30/2				
Minimum Net DPM Observed: 3465	Mean Net DPM: 26754				
Maximum Net DPM Observed: 45614	STDEV Observed: 11239	# of Samples Taken: 20			
Lee Severtson	Lu hr	10-30-09			
Print Name	Signature	Date			

omments: Material block back receiving	eground for a ver en	background om unpain tryway was	used. A ted block	concrete
This is obvious = 4196cpm, X100 cm² =				

Sign-Off PAUL ELY Print Name | Page 1 of 2

# Duratek Beta Survey Report

Download File Name: 00000046

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
ZZZZZ	ZZZZZ	0	3,266.0	600	PRBBK	B9999	77777	1	0	3,465
ZZZZZ	ZZZZZ	1	1,582.0	60	PRBBK	B9999	ZZZZZ	2	0	16,786
ZZZZZ	Z2ZZZ	2	4,299,0	60	PRBBK	B9999	27777	3	0	45,614
SU13F	Wat	3	2,776.0	60	FLDCT	B0005	22222	14	804	20,924
SU13F	Wo1	4	3,576.0	60	FLDCT	B0005	22222	13	804	29,412
SU13F	W01	5	2,293.0	60	FLDCT	B0005	27222	12	804	15,799
SU13F	VV01	6	3,050.0	60	FLDCT	B0005	27777	11	804	23.831
SU13F	W01	7	3,913.0	60	FLDCT	B0005	27777	10	804	32,987
SU13F	WD1	8	4,072.0	60	FLDCT	80005	77777	9	804	34,674
SU13F	W01	9	2,680,0	60	FLDCT	B0005	27272	8	804	19,905
SU13F	W01	10.	3,411.0	60	FLDCT	80005	22272	7	804	27,661
SU13F	W01	11	3,621.0	60	FLDCT	B0005	77777	21	804	29.889
SU13F	W01	12	3,912 0	60	FLDCT	80005	ZZZZZ	20	804	32.977
SU13F	W01	13	3,980,0	60	FLDCT	B0005	77777	19	804	33,698
SU13F	W01	14	4,156.0	80	FLOCT	B0005	22222	18	804	35,566
SU13F	W01	15	2,921.0	60	FLDCT	B0005	77777	17	804	22,462
SU13F	Wot	16	3,559.0	60	FLDCT	B0005	27777	16	804	29,231
SU13F	W01	17	3,839.0	60	FLDCT	B0005	22722	15	804	32,202
77777	22272	18	3,308.0	600	PTBBK	22222	22222	1	0	3,510
23222	22222	19	4.193.0	60	PTSCI	ZZZZZ	22272	6	· m	44,489

Beta Flag	45000
Beta Max Flag	60000

Friday, October 30, 2009

Page 2 of 2



M2350-1 Download BETA Report

File Name : 00000047 Survey Descri	ription :SU13F Walls Points 1-6,21-	-30				
Survey Reason : Final Status						
User ID :: RPS2366	Technician Name : Richard Stor	ney				
Instrument Model : 2350-1	Instrument S/N : 95359	Instrument Cal. Due : 9/30/2010				
Detector Model : 43-68b	Detector S/N: 119337	Detector Cal. Due : 9/30/2010				
Measurement Type: BETA	Detector Type: 02200: 126 cm2 Gas Proportional Detector					
Detector Area : 126	Efficiency: 0.0938	Survey Date : 10/30/2009				
Minimum Net DPM Observed: -2981	Mean Net DPM: 10764					
Maximum Net DPM Observed: 29631	STDEV Observed: 11529, # of Samples Taken: 20					
Richard Stoney	KeldVAV	10-30-2009				
Print Name	Signature	10-30-2009 Date				
Print Name	Signature	Date				

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Sign-Off PAUL ELY Signature 10/30/09
Date

Page \_\_\_\_ of \_\_\_\_

# Duratek Beta Survey Report

Download File Name: 00000047

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	Net (DPM/100cm2)
SU01	F01	0	398.0	60	PRBBK	B9999	77777	1		
SU01	F01	1	3,951.0	60	PRSC1	B9999	22222	1		
SU01	F01	2	4,332.0	60	PRSC1	B9999	22222	1		
SU13F	W0001	3	512.0	60	FLDCT	B0005	77777	1	804	-2.471
SU13F	W0001	4	710.0	60	FLDCT	B0005	22222	2	804	-795
SU13F	W0001	5	869.0	60	FLDCT	80005	27777	3	604	550
SU13F	W0001	6	557,0	60	FLDCT	B0005	22272	4	804	-2,090
SU13F	W0001	7	517.0	60	FLDCT	B0005	77777	5	804	-2.428
SU13F	WODDT	8	744.0	60	FLDCT	Boogs	22772	6	804	-508
SU13F	VV0001	9	2,333.0	60	FLDCT	B0005	ZZZZZ	22	804	12,937
SU13F	W0001	10	2,175.0	60	FLDCT	B0005	27777	23	804	11,600
SU13F	W0001	11	3,269.0	60	FLDCT	B0005	ZZZZZ	24	804	20,857
SU13F	W0001	12	3,273.0	60	FLDCT	B0005	77777	25	804	20,890
SU13F	Woodt	13	2,509.0	60	FLDGT	B0005	ZZZZZ	26	804	14,426
SU13F	W0001	14	2,797.0	60	FLDCT	B0005	22272	27	804	16,863
SU13F	W0001	15	4,100.0	60	FLDCT	B0005	22222	28	804	27,888
SU13F	W0001	16.	2,955,0	60	FLDCT	B0005	27272	29	804	18,200
SU13F	W0001	17	3,217.0	60	FLDCT	B0005	ZZZZZ	30	804	20,417
SU13F	VV0001	18	4.517.0	600	PTBBK	B0005	77777	31	804	-2.981
SEI13F	W0001	10	1306.0	80	PTSCI	B0005	27727	32	904	29,631

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Beta Max Flag	60000

Friday, October 30, 2009

Page 2 of 2

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ata Mode	: Dual DPM		Nuclides:	3H-14C	<b>Guenc</b>	h Sets					
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ackground	Subtract: 1st	Vial			Hi	gh Energ	y: 14C				
		1.00	5nu	nua.							
eaion A:	LL UL 0.0 - 12.0	LCR 0	25% 0.0	BK6 7.16							
edion B:	12.0 - 156	0		5.84							
egion C:	0.0 - 0.0	0		0.00							
-dron or	010		0.0	7.00							
uench Ind	dicator: tSIE/AE	EC.									
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35 Smears	in 20 ml Ultim	ma Gold	1								
pincidenc	e Time(ns): 18										
	ore Burst(ns): N										
	ata Filename: C										
unt Data	Filename: C:\E	:P\SDAT	A2.001								
#PID S#	SMPL ID	TIME	CPMAA:28%	CPMBB:25%	TU_DDW	LAC DOM	tSIE FLA				
2 1 1	SHLF ID	10.0	9.2 20.9	16.8 15.4	0.00	0.00		8			
2 1 2	SU13 Wall#1	1.0	11.8 79.1	6.2 161	33,29	5,74	423	D			
1 1 3	SU13 Wall#2	1.0	3.0 239	7.0 117	3,43	10.67	430				
2 1 4	SU13 Wall#3	1.0	18.3 58.2	36.7 40.5	44.31	42.87	385				
1 1 5	5U13 Wall#4	1.0	11.4 80.2	14.4 79.8	28.46	16.02	43B				
2 1 6	SU13 Wall#5	1.0	0.6 1109	8,4 123	0.00	10.38	427				
2 1 7	8012 Wall#6	1.0	16.2 53.2	21.8 58.3	45.21	24,49	376				
2 1 8	SU13 Wall#7	1.0	1.4 496	20.5 50.6	0,00	25.48	427				
1 1 9	SUI3 Wall#8	1.0	18.8 57.1	35.2 41.7	42.37	40.72	425				
						10115	760				
2 1 10	5U13 Wall#9	1.0	18.8 57.1	61,2 29,2	32.15	73,13	421				
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1 1 11 2 1 12	5U13 Wall#10 SU13 Wall#11	1.0	8.5 102 17.9 59.0			73,13	421				
2 1 12	5013 Wall#10 5013 Wall#11 5013 Wall #12	1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5	23.5 55.1 39.1 38.8 58.6 30.0	15.74	73,13 27.89	421 432 42E 415				
1 11 2 1 12 1 2 13 2 2 14	2012 Mall #15 2012 Mall #15 2012 Mall#11 2012 Mall#10	1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5 8.7 99.4	23.5 55.1 39.1 38.8 58.6 30.0 31.3 45.1	15.74 37.85 10.66 13.61	73,13 27.89 45.73 71.23 37.53	421 432 42E 415 420				
1 11 2 1 12 1 2 13 2 2 14 2 2 15	SUI3 Wall#10 SUI3 Wall#11 SUI3 Wall #12 SUI3 Wall #13 SUI3 Wall #14	1.0 1.0 1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5 8.7 99.4 25.3 46.7	23.5 55.1 39.1 38.8 58.6 30.0 31.3 45.1 54.5 31.4	15.74 37.83 10.66 13.61 56.28	73,13 27,89 45,73 71,23 37,53 63,67	421 432 428 415 427 413				
1 11 2 1 12 2 1 13 2 2 14 1 2 15 2 2 16	EUI3 Wall#10 EUI3 Wall#11 EUI3 Wall #12 SUI3 Wall #13 EUI3 Wall #14 EUI3 Wall #14	1.0 1.0 1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5 8.7 99.4 25.3 46.7 4.6 167	23.5 55.1 39.1 38.8 58.6 30.0 31.3 45.1 54.5 31.4 15.4 72.0	15.74 37.85 10.66 13.61 56.28 6.97	73,13 27,89 45,73 71,23 37,53 63,67 19,68	421 432 426 415 427 413 437				
1 11 2 1 12 1 2 13 2 2 14 1 2 15 2 2 16 1 3 17	5013 Wall#10 5013 Wall#11 5013 Wall #12 5013 Wall #13 5013 Wall #14 5013 Wall #15 5013 Wall #15	1.0 1.0 1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5 8.7 99.4 25.3 46.7 4.6 167 7.6 110	23.5 55.1 39.1 38.8 58.6 30.0 31.3 45.1 54.5 31.4 15.4 72.0 12.4 90.0	15.74 37.83 10.66 13.61 56.28 6.97 17.54	73,13 27,89 45,73 71,23 37,53 63,67 19,68 14,14	421 432 428 415 427 413 437 440				
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1 1 11 2 1 12 1 2 13 2 2 14 1 2 13 2 2 16 1 3 17 2 2 18 2 2 18 2 2 19 2 2 20	5U13 Wall#10 5U13 Wall#11 5U13 Wall #12 SU13 Wall #13 SU13 Wall #13 SU13 Wall #14 5U13 Wall #16 SU13 Wall #17 SU13 Wall #18 SU13 Wall #18	1.0 1.0 1.0 1.0 1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5 8.7 99.4 25.3 46.7 4.6 167 7.6 110 10.8 84.4 4.6 167 3.1 231	23,5 55,1 39,1 38,8 58,6 30,0 31,3 45,1 54,5 31,4 15,4 72,0 12,4 90,0 19,2 64,1 39,4 38,6 16,9 70,8	15.74 37.85 10.66 13.61 56.28 6.97 17.54 24.25 0.00 2.36	73,13 27,89 45,73 71,23 37,53 63,67 19,68 14,14 22,10 48,34 20,47	421 432 425 415 427 413 437 440 436 429 430				
1 11 2 1 12 1 2 13 2 2 14 1 2 15 2 2 16 1 3 17 2 2 18 2 2 19 2 2 20 1 3 31	5U13 Wall#10 5U13 Wall#11 5U13 Wall #12 5U13 Wall #13 5U13 Wall #15 5U13 Wall #15 5U13 Wall #16 5U13 Wall #17 5U13 Wall #18 5U13 Wall #19 5U13 Wall #19 5U13 Wall #19	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5 8.7 99.4 25.3 46.7 7.6 110 10.8 84.4 4.5 167 3.1 231 4.3 176	23.5 55.1 39.1 38.8 58.6 30.0 31.3 45.1 54.5 31.4 15.4 72.0 12.4 90.0 19.2 64.1 39.4 38.6 16.9 70.6 26.7 50.4	15.74 37.85 10.66 13.61 56.28 6.97 17.54 24.25 0.00 2.56 1.99	73,13 27,89 45,73 71,23 37,53 63,67 19,68 14,14 22,10 48,34 20,47 32,33	421 432 426 415 427 413 437 440 436 429 437 436				
1 (1) 2 (1) 2 (1) 2 (2) 3 (2) 2 (2) 4 (3) 2 (2) 3 (4) 4 (4) 5 (4) 6 (4)	5U13 Wall#10 SU13 Wall#11 SU13 Wall#13 SU13 Wall#13 SU13 Wall#15 SU13 Wall#15 SU13 Wall#15 SU13 Wall#16 SU13 Wall#17 SU13 Wall#17 SU13 Wall#17 SU13 Wall#17 SU13 Wall#17 SU13 Wall#17 SU13 Wall#17	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	8.5 102 17.9 59.0 11.4 81.5 8.7 99.4 25.3 46.7 7.6 110 10.8 84.4 4.6 167 3.1 231 4.3 176 6.6 124	23.5 55.1 39.1 38.8 58.6 30.0 31.3 45.1 54.5 31.4 15.4 72.0 19.2 64.1 19.2 64.1 19.2 64.1 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10	15,74 37,85 10,66 13,61 56,28 6,97 17,54 24,25 0,00 2,56 1,99 12,88	73,13 27,89 45,73 71,23 37,53 63,67 19,68 14,14 22,10 48,34 20,47 32,33 19,35	421 432 426 415 427 413 437 440 436 429 437 436 437				
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## 5.0 QUALITY ASSURANCE AND QUALITY CONTROL

All work was performed in a quality manner and under the implementing procedures as listed in Attachment 7.1.

The following Quality Control measures were utilized as an integral part of the survey process.

### 5.1 **Selection of Personnel**

Project management and supervisory personnel reviewed and were familiar with the procedures referenced in Attachment 7.1.

Personnel for the FSS were selected based upon their qualifications and experience.

### 5.2 Written Procedures

Procedures referenced in Attachment 7.1 controlled all survey tasks performed to ensure survey data quality.

# 5.3 Instrumentation Selection, Calibration, and Operation

Instruments proven to reliably detect C-14 were utilized. EnergySolutions calibrated instruments in accordance with procedure CS-FO-PR-002 (Attachment 7.1) using calibration sources traceable to the NIST. All detectors were subjected to daily response checks, when in use, in accordance with procedure CS-FO-PR-004 (Attachment 7.1).

## 5.4 Survey Documentation

Records of surveys were documented and managed in accordance with procedure CS-FO-PR-001 (as listed in Attachment 7.1). Survey measurements were identified by the date, technician, instrument type and serial number, detector type and serial number, location code, type of measurement, mode of instrument operation, and sample number, as applicable.

The field data collected was managed using forms. Onsite liquid scintillation data was maintained on its computer-based data management system. All measurements taken during this project were identified by source, type, and sample location to avoid ambiguity. Field records included the following information:

- Site Name, surveyor name, signature, and date
- Sample times
- Records of all measurements (e.g. field screening parameters).

### 5.5 **Records Management**

The generation, handling, and storage of survey data packages was controlled by procedure CS-AD-PR-002 (as listed in Attachment 7.1).

### 6.0 REFERENCES

- 6.1 EnergySolutions, CS-HP-PN-010, Characterization Report for EaglePicher, Lenexa Kansas, Rev. 0.
- 6.2 EnergySolutions, CS-HP-PN-011, Decommissioning Plan for EaglePicher Research and Development Laboratory, Lenexa Kansas, Rev. 0.
- 6.3 EnergySolutions, ES-QA-PG-001, Quality Assurance Program, Rev. 0.
- 6.4 EnergySolutions, CS-RS-PG-001, *Radiation Protection Program Commercial Services Projects*, Rev. 0.
- 6.5 EnergySolutions, CS-SH-PN-030, EaglePicher Research and Development Laboratory Project Health and Safety Plan, Rev. 0.
- 6.6 U.S. Nuclear Regulatory Commission, NUREG-1757, Consolidated Decommissioning Guidance Decommissioning Process for Materials Licensees, includes the September 2006 updates.
- 6.7 U.S. Nuclear Regulatory Commission, NUREG 1575, Revision 1, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*; August 2000, includes the June 2001 updates.
- 6.8 *COMPASS Code* Version 1.1.0 was developed under the sponsorship of the U.S. Nuclear Regulatory Commission for implementation of MARSSIM in support of the decommissioning license termination rule (10 CFR Part 20, Subpart E).
- 6.9 Shaw Environmental, Inc., *Historical Site Assessment EaglePicher*Pharmaceutical Services LLC 13605 West 96th Terrace Lenexa, Kansas 662151297, December 2008.
- 6.10 Shaw Environmental, Inc., Soil Derived Concentration Guideline Levels EaglePicher Pharmaceutical Services LL 13605 West 96th Terrace Lenexa, Kansas 66215-1297, April 2009.
- 6.11 Shaw Environmental, Inc., Letter from Greg Coffman to Thomas A. Conley of KDHE, RE: Revised Soil DCGL Report, May 4, 2009.
- 6.12 U.S. Nuclear Regulatory Commission, *Materials License Number 06-20775-01*, issued to EnergySolutions.
- 6.13 Kansas Department of Health and Environment, *State of Kansas Radioactive Materials License Reciprocity Approval Number 2009-063*, October 19, 2009.

## 7.0 ATTACHMENTS

- 7.1 Energy Solutions Plans and Procedures
- 7.2 Instrument Calibration Certificates
- 7.3 Instrument Static and Scan MDC Worksheets
- 7.4 COMPASS Survey Plans and Survey Location Calculations
- 7.5 Landfill Activity Estimate
- 7.6 Laboratory Analytical Reports

# Attachment 7.1: EnergySolutions Plans and Procedures 2 Attachment 7.2: Instrument Calibration Certificates 3 Attachment 7.3: Beta Instrument Static and Scan MDC Worksheets 39 Attachment 7.4: COMPASS Survey Plans and Survey Location Calculations 45 Attachment 7.5: Landfill Activity Estimate 82 Attachment 7.6: Laboratory Analytical Reports 84

# **Attachment 7.1:** EnergySolutions Plans and Procedures

Procedure Number	Procedure Title
CS-FO-PR-001	General Radiological Survey and Air Sampling Procedure for Field Projects
CS-FO-PR-002	Calibration and Maintenance of Radiological Survey and Sampling Equipment Procedure
CS-FO-PR-004	QA/QC of Portable Radiological Survey Instruments
CP-CSA-203	Ludlum Model 2350-1 Series Data Logger Download
CP-INST-201	Operation of the Ludlum Model 2350-1 Series Data Loggers
ES-AD-PR-009	Control of Measuring and Test Equipment

Attachment 7.2: Instrument Calibration Certificates

Summary of FSS Beta Survey Instruments Used

Instrume	nt	Detector					
Model Serial Number		Model	Serial Number	C-14 Efficiency (%)			
Ludlum 2350-1	80502	Ludlum 43-68	095523	6.81			
Ludlum 2350-1	95359	Ludlum 43-68	119337	9.38			
Ludlum 2350-1	117566	Ludlum 43-68	091028	7.48			
Ludlum 2350-1	117566	Ludlum 43-68	134489	7.57%			
Ludlum 2350-1	126198	Ludlum 43-68	075149	6.81%			
Ludlum 2350-1	117573	Ludlum 44-10	157372	N/A			
Ludlum 2350-1	126183	Ludlum 44-10	192598	N/A			
Ludlum 2350-1	117555	Ludlum 44-10	227358	N/A			
Ludlum 177	45602	Ludlum 44-9	176080	N/A			
Packard Tri-Carb	401663	Smear Counter	401663	95.83%			

### Ludlum 43-68 #095523 Calibration Certificate



DETECTOR CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337

Fax: (865) 376-8331 This Certificate will be accompanied by Calibration Charts or Readings where applicable CUSTOMER INFORMATION DETECTOR INFORMATION Customer Name: Duratek Instrument Services Manufacturer: Ludium Address: 628 Gallaher Rd Kingston, TN 37763 Detector Model: 43-68B Contact Name: Tony Riggs Serial Number: 095523 Customer Purchase Order Work Order **Evaluation Method:** Number: N/A Number: 2009-10385 Source DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION 1) Source Nuclide: C-14 Serial Number: 010002 Activity (dpm): 260,460 Certification Date: 12/14/99 Parameter As Found As Left Precision Test CPM (Source #1) Count 1 37,510 37,510 Count 1(Heel) 33,104 Count 2 37,660 37,660 Count 2(Center) 37,523 Count 3 37,537 37,537 Count 3(Toe) 32,270 Average 37,569 37,569 Average 34,299 Background (cpm) 338.8 338.8 All counts within ±10% of Average Tolerance **Net Counts** 37,230 37,230 Pass/Fail **PASS** Efficiency 14.3% 14.3% Low Sample Activity: High Sample Activity: Dead Time (DT): Calibration Constant (CC): Source #: N/A Source #: N/A 22.1E-6 SCALER INFORMATION DETECTOR INFORMATION Operating Model Serial Number Due Date Background (cpm) Threshold Voltage 2350-1 80502 09/30/2010 338.8 1750V 40 = 4 mV**Detector Setup Report** YES √ NO Barcode Report YES √ NO Voltage Plateau YES √ NO COMMENTS \*\*Calibrated with 25Ft. Cable\*\* Calibrated in accordance with CP-IN-WI-237 Rev 1 10 minute background 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig STATEMENT OF CERTIFICATION We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector). Detector Certified By: M Reviewed By: Certification Date: 09/30/2009 Certification Due: 09/30/2010

```
background plateau 43-68#095523 9/28/2009
  950
1000
           0
  1050
           0
  1100
  1150
           1
  1200
           3
           2
  1250
  1300
  1350
           6
  1400
           10
  1450
  1500
  1550
           17
  1600
           65
1650
1700
1750
1800
           123
           372
           681
  1850
           895
  1900
           1069
 1950
          1286
 alpha plateau Th-230#119738 18,600dpm 900 0
 950
           0
          0
 1000
          0
35
 1050
 1100
 1150
          1538
 1200
          2751
3471
 1250
 1300
          3810
 1350
          3916
 1400
          3948
 1450
          4035
 1500
          4031
 beta plateau Tc-99#099608 18,600dpm
 1400
 1450
          13
 1500
          168
 1550
          945
 1600
          2062
1650
1700
1750
          3457
          4952
          5612
 1800
          5942
 1850
          6626
 1900
          7461
 1950
          9215
```

DETECTOR SETUP CHECK LIST REPORT
The following list is stored as detector setup D2 in the Model 2350.
Today's date is 09/30/2009.
The current time of day is: 12:19:19.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE:

Comments:

80502. Model 2350 Serial # = User I.D. = High Voltage = 1750 volts. Threshold = 40. Window = 1000,Off. Overload Current = 40.0 micro amperes. 60 seconds. counts. Scaler Count Time = Readout Units = Readout Time Base = Readout Range Multiplier = min.

Detector Dead Time = 2 210 2.210000E-05. Detector Calibration Constant = 1.000000E+00. 43-68B. 095523 Detector Model = Detector Serial # = 095523. Ratemeter Alarm Setting = 1.000000 Scaler Alarm Setting = 1000000. 1.000000E+09. Integrated Dose Alarm Setting = 1.000000E+09. Integrated Dose Alaim Setting X.

Low Count Alarm Setting = X.

5.3 volts.

# Ludlum 43-68 #119337 Calibration Certificate



DETECTOR CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector	Fax: (865) 376-8331	This Certific	ate will be acc	ompanied by Calibration Cl	narts	or Readings who	ere ar	plicable		
Detector Model: 43-68B			DETECTOR INFORMATION							
Contact Name: Tony Riggs	Customer Name: Duratek Instrument Services					Manufacturer: Ludlum				
Customer Purchase Order   Number: 2009-10385   Evaluation Method:   Source	Address: 628 Gallaher Rd Kingston, TN 37763					Detector Model	: 4	3-68B		
Number: N/A   Number: 2009-10385   Source	Contact Name: Tony Rigg	įs				Serial Number:	1	19337		
1) Source Nuclide: C-14   Serial Number: 010002   Activity (dpm): 260,460   Certification Date: 12/14/99										
Parameter		DETE	CTOR EFFIC	IENCY/RESPONSE/PRE	CIS	SION INFORMA	ATIC	N		
Count 1	1) Source Nuclide: C-14	Serial Num	ber: 010002	Activity (dpm): 260,460		Cer	rtific	ation Date: 12/14	/99	
Count 2	Parameter	As Found	As Left	Precision "	Test			CPM (Sou	rce #1)	
Count 3 51,448 51,448 Count 3(Toe) 44,006  Average 51,659 51,659 Average 46,780  Background (cpm) 269.6 269.6 Tolerance All counts within ±10% of Average  Net Counts 51,389 51,389 Pass/Fail PASS  Efficiency 19.7% 19.7%  Low Sample Activity: High Sample Activity: Source #: N/A DETECTOR INFORMATION  Model Serial Number Due Date Background (cpm) Operating Voltage Threshold 2350-1 95359 09/30/2010 269.6 1800V 40 = 4mV  Detector Setup Report YES ✓ NO Barcode Report YES ✓ NO Voltage Plateau YES ✓ NO  COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Reviewed By: Date: 7/30/07	Count 1	51,911	51,911	Count 1(H	leel)	)	*********	45,03	0	
Average 51,659 51,659 Average 46,780  Background (cpm) 269.6 269.6 Tolerance All counts within ±10% of Average  Net Counts 51,389 51,389 Pass/Fail PASS  Efficiency 19.7% 19.7%  Low Sample Activity: High Sample Activity: Dead Time (DT): Calibration Constant (CC): Source #: N/A 22.1E-6 1.0  SCALER INFORMATION DETECTOR INFORMATION  Model Serial Number Due Date Background (cpm) Operating Voltage Threshold 2350-1 95359 09/30/2010 269.6 1800V 40 = 4mV  Detector Setup Report YES \( \sqrt{NO} \) NO Barcode Report YES \( \sqrt{NO} \) NO Voltage Plateau YES \( \sqrt{NO} \) NO  COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Date: 7/30/09	Count 2	51,619	51,619	Count 2(Ce	ntei	r)		51,30	3	
Background (epm)   269.6   269.6   Tolerance   All counts within ±10% of Average	Count 3	51,448	51,448	Count 3(T	oe)			44,006		
Net Counts 51,389 51,389 Pass/Fail PASS  Efficiency 19.7% 19.7% 19.7%  Low Sample Activity: High Sample Activity: Dead Time (DT): Calibration Constant (CC): 22.1E-6 1.0  SCALER INFORMATION DETECTOR INFORMATION  Model Serial Number Due Date Background (cpm) Voltage Threshold Voltage Threshold 2350-1 95359 09/30/2010 269.6 1800V 40 = 4mV  Detector Setup Report YES √ NO Barcode Report YES √ NO Voltage Plateau YES √ NO COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1 10 minute background 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: M. Facel Reviewed By: Pass/Fail	Average	51,659	51,659	Average	e		46,780			
Efficiency  19.7% 19.7%  Low Sample Activity: Source #: N/A  Source #: N/A  Source #: N/A  DETECTOR INFORMATION  Model Serial Number Due Date Background (cpm) Voltage Threshold Voltage  2350-1 95359 09/30/2010 269.6 1800V 40 = 4mV  Detector Setup Report YES \( \sqrt{NO} \) NO Barcode Report YES \( \sqrt{NO} \) NO Voltage Plateau YES \( \sqrt{NO} \) NO  COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1  10 minute background 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for larnage incurred during shipment or use of this detector).  Poetector  Certified By: Reviewed By: Parallel Reviewed By: Date: 7/30/09	Backgrouad (cpm)	269.6	269.6	Tolerano	ce		All counts within ±10% of Average			
Low Sample Activity: Source #: N/A  Scaler Information  Model  Serial Number  Due Date  Background (cpm)  Voltage  Threshold  Voltage  Threshold  2350-1  95359  09/30/2010  269.6  1800V  40 = 4mV  Detector Setup Report  YES ✓ NO  Barcode Report  YES ✓ NO  Voltage Plateau YES ✓ NO  COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1  I LAYER MYLAR (0.4mg)  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for large incurred during shipment or use of this detector).  Detector  Certified By: M. Fall Reviewed By: Plankara Date: 9/30/09	Net Counts	51,389	51,389	Pass/Fai	il		PASS		S	
Source #: N/A Source #: N/A 22.1E-6 1.0  SCALER INFORMATION  Model Serial Number Due Date Background (cpm) Voltage Threshold  2350-1 95359 09/30/2010 269.6 1800V 40 = 4mV  Detector Setup Report YES \( \sqrt{NO} \) NO Barcode Report YES \( \sqrt{NO} \) NO Voltage Plateau YES \( \sqrt{NO} \) NO  COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1  10 minute background 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Plantage Date: 7/30/09	Efficiency	19.7%	19.7%				•	. , , , , , , , , , , , , , , , , , , ,	***************************************	
Model   Serial Number   Due Date   Background (cpm)   Voltage   Threshold					Dea				stant (CC):	
2350-1 95359 09/30/2010 269.6 1800V 40 = 4mV  Detector Setup Report YES √ NO Barcode Report YES √ NO Voltage Plateau YES √ NO  COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1  10 minute background 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Plantage Date: 7/30/09	SCALER INF	ORMATION			DI	ETECTOR INFO	ORM	ATION		
2350-1  95359  09/30/2010  269.6  1800V  40 = 4mV  Detector Setup Report  YES √ NO  Barcode Report  YES √ NO  Voltage Plateau YES √ NO  COMMENTS  **Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1  10 minute background  1 LAYER MYLAR (0.4mg)  Efficiency determined w/43-68 source jig  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for larmage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Physikara Date: 7/30/09	Model	Serial N	lumber	Due Date Background (cr		<u>m)</u>		Threshold		
**Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1  10 minute background  1 LAYER MYLAR (0.4mg)  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By:  Reviewed By:  Date: 7/30/09	2350-1	95.	359	09/30/2010		269.6			40 = 4 mV	
**Calibrated with 25Ft. Cable**  Calibrated in accordance with CP-IN-WI-237 Rev 1  10 minute background  1 LAYER MYLAR (0.4mg)  Efficiency determined w/43-68 source jig  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By:  Reviewed By:  Date: 7/30/09	Detector Setup Report	YES √	NO	Barcode Report	YES	s√ no		Voltage Plateau	ı YES√ NO	
1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig  STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Plantage Date: 9/36/09				COMMENTS			*****			
STATEMENT OF CERTIFICATION  We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Plantage Date: 9/30/09	**Calibrated with 25Ft. Ca	ble**				Calibrated in a	ccord	lance with CP-IN	-WI-237 Rev 1	
We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Plantage Date: 9/36/09	10 minute background		1 LAYI	ER MYLAR (0.4mg)		Efficiency deter	min	ed w/43-68 source	jig	
pecifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for lamage incurred during shipment or use of this detector).  Detector  Certified By: Reviewed By: Date: 9/30/09										
Certified By: M. Paul Reviewed By: PM Binso Date: 9/30/09	specifications. We further certify	that our Calibra	ition Measureme	r operation prior to shipment an ints are traceable to the Nationa	nd th Il Ins	at it met all the Ma titute of Standards	nufact and T	urers published oper echnology. (We are	rating not responsible for	
4/1/2	Detector  Certified By: M. Te	ڪر. ا	Reviewed Bv:	Q110.h	in	se n	ate:	9/30/1	99	
		09		TUI TUI						

```
background plateau 43-68#119337 9/28/2009 900 0
 900
950
           0
  1000
           0
  1050
           0
  1100
  1150
          2
  1200
          0
          3
 1250
 1300
1350
          1
 1400
 1450
 1500
 1550
          13
 1600
          44
 1650
          101
 1700
1750
          241
          276
1800
          329
 1850
          375
 1900
          586
 1950
          709
 alpha plateau Th-230#119738 18,600dpm 900 0
 950
          0
          0
 1000
          2
633
 1050
 1100
 1150
          2082
 1200
          3257
1250
          3838
1300
          4050
 1350
          4135
1400
          4222
1450
          4216
1500
          4239
beta plateau Tc-99#099608 18,600dpm
1400
1450
          37
1500
1550
         1474
         2840
1600
1650
         4441
1700
1750
         5438
          6237
1800
         7076
1850
         8872
```

DETECTOR SETUP CHECK LIST REPORT The following list is stored as detector setup D2 in the Model 2350. Today's date is 06/13/2002. The current time of day is: 03:14:00.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE:  $\bigcirc$ 

Comments:

Model 2350 Serial # = 95359. User I.D. = High Voltage = 1800 volts. Threshold = 40. Window = 1000,Off. Overload Current = 40.0 micro amperes. Scaler Count Time = 60 seconds. Readout Units = counts. Readout Time Base = min. Readout Range Multiplier = auto.
Detector Dead Time = 2.210 Detector Dead Time = 2.210000E-05. Detector Calibration Constant = 1.000000E+00. Detector Model = 43-68B. Detector Serial # = 119337. Ratemeter Alarm Setting = 1.000000E+09. Scaler Alarm Setting = 1000000. Integrated Dose Alarm Setting = 1.000000E+09. Low Count Alarm Setting = X.
Operating Battery Voltage - 5.1 Operating Battery Voltage = 6.1 volts.

# Ludlum 43-68 #091028 Calibration Certificate



DETECTOR CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337

Fax: (865) 376-8331	This Certific	ate will be acco	ompanied by Calibration Cl	nart	ts or Readings wh	ere ap	plicable		
	CUSTOMER INFORMATION						TOR INFORMA	TION	
Customer Name: Duratek Instrument Services					Manufacturer: Ludlum				
Address: 628 Gallaher Rd Kingston, TN 37763					Detector Mode	1: 43	3-68B		
Contact Name: Tony Rigg	s				Serial Number:	: 09	1028		
Customer Purchase Order Number: N/A	009-10385		Evaluation Method: Source						
	DETE	CTOR EFFIC	IENCY/RESPONSE/PRE	CI	SION INFORM	ATIO	N		
1) Source Nuclide: C-14	Serial Num	ber: 010002	Activity (dpm): 260,460		Ce	rtifica	ntion Date: 12/14	/99	
Parameter	As Found	As Left	Precision	Tes	st		CPM (Sou	rce #1)	
Count 1	41,046	41,046	Count 1(F	lee	l)		33,76	<b>i</b> 3	
Count 2	41,315	41,315	Count 2(Ce	nte	er)		41,13	1	
Count 3	41,525	41,525	Count 3(7	oe	)		37,51	2	
Average	41,295	41,295	Averag	e			37,46	9	
Background (epm)	278.4	278.4	Toleran	ce		All	All counts within ±10% of Average		
Net Counts	41,017	41,017	Pass/Fa	il			PASS		
Efficiency	15.7%	15.7%							
Low Sample Activ Source #: N/A			Sample Activity: Dead Time (DT): urce #: N/A 22.1E-6			Calibration Constant (CC): 1.0			
SCALER INF	ORMATION			D	ETECTOR INF	ORM	ATION		
<u>Model</u>	Model Serial N		Due Date		Background (cpm		Operating Voltage	Thresh	ıold
2350-1	117	566	09/28/2010		278.4		1800V	40 = 41	mV
Detector Setup Report	YES √	NO	Barcode Report	YE	Es√ NO		Voltage Platea	u YES√	NO
			COMMENTS						
**Calibrated with 25Ft. Ca	ble**				Calibrated in a	accord	lance with CP-IN	-WI-237 R	lev 1
10 minute background			ER MYLAR (0.4mg)			rmin	ed w/43-68 source	e jig	
We Certify that the detector liste	d above was eve		TEMENT OF CERTIFIC			anufec	turare nublished one	entina	<del></del>
specifications. We further certify damage incurred during shipmer	that our Calibra	ation Measureme							ble for
Detector	_		001				9 in l =	· .	
Certified By: N. T.		Reviewed By:	: Jeff Oulsi	120	20 D	Date:	9/30/6	7	
Certification Date: 09/30/20	109		· · ·		Certification Du	1e: 09/	30/2010		

```
background plateau 43-68#091028 9/29/2009
  950
  1000
           Ó
  1050
           0
  1100
           2
  1150
           1
  1200
  1250
           15
  1300
           11
  1350
  1400
           9
           13
13
  1450
  1500
  1550
           22
  1600
           29
  1650
           66
  1700
          101
1750
1800
1850
           228
          290
372
  1900
          439
 1950
          565
 alpha plateau Th-230#119738 18,600dpm
 950
          0
 1000
          0
0
1
 1050
1100
 1150
          1132
 1200
          2659
 1250
          3542
 1300
          3883
 1350
          4106
 1400
          4127
 1450
          4172
 1500
          4175
 beta plateau Tc-99#099608 18,600dpm
 1400
         10
 1450
         13
 1500
          43
 1550
         454
1600
         1422
1650
         2768
1700
         4417
 1750
         5429
£1800
         5871)
1850
         6021
1900
         187271
```

DETECTOR SETUP CHECK LIST REPORT The following list is stored as detector setup D2 in the Model 2350. Today's date is 06/13/2002. The current time of day is: 20:56:24.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE: M?

Comments:

Model 2350 Serial # = 117566. User I.D. = High Voltage = 1800 volts. Threshold = 40. Window = 1000,Off. Overload Current = 40.0 micro amperes. Scaler Count Time = 60 seconds. Readout Units = counts. Readout Time Base = min. Readout Range Multiplier = Detector Dead Time = auto. Detector Dead Time = 2.210000E-05.
Detector Calibration Constant = 1.000000E+00.
Detector Model = 43-68B. Detector Serial # = 091028. Ratemeter Alarm Setting = 1.000000E+09. Scaler Alarm Setting = 1000000. Integrated Dose Alarm Setting = 1.000000E+09.
Low Count Alarm Setting = X.
Operating Battery Voltage = 5.9 volts. Operating Battery Voltage = 5.9 volts.

# Ludlum 43-68 #134489 Calibration Certificate



Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331 DETECTOR CERTIFICATE

	مالا	DETECTOR INFORMATION								
Customer Name: Duratek Instrument Services					Manufacturer: Ludlum					
Address: 628 Gallaher Rd Kingston, TN 37763					Detector Model: 43-68B					
Contact Name: Tony Rig	ggs			Sei	rial Number:	134489				
Customer Purchase Ord Number: N/A	r Evaluation Me			thod:						
	DETE	CTOR EFFIC	TENCY/RESPONSE/PRI	ECISIO		TION				
1) Source Nuclide: C <sup>14</sup>	Serial Num	ber: 019708	Activity (dpm): 26,045		Cert	fication Date: 11/2	0/96			
Parameter	As Found	As Left	Precision	Test			urce #1)			
Count I	4627	4627	Count I(I	Teel)		46				
Count 2	4441	4441	Count 2(Co	enter)		444	11			
Count 3	4436	4436	Count 3(1	roe)		443	36			
Average	4501.3	4501.3	Averag	e		4501.3				
Background (cpm)	368	368	Tolerance			All counts within ±10% of Averag				
Net Counts	4133.3	4133.3	Pass/Fail			PASS				
Efficiency	15.9%	15.9%								
Low Sample Activ Source #: N/.			Sample Activity: Dead Time (DT): arce #: N/A 22.1E-6			Calibration Constant (CC):				
SCALER INF	ORMATION			1.71 00	CTOR INFOR					
Model	Serial N	umber	Due Date	Bacl	kground (cpm)	Operating Voltage	Threshold			
2350-1	1175	566	10/08/09		368	1850V	40 = 4mV			
Detector Setup Report	YES √	NO	Barcode Report	YES √	NO	Voltage Platea	u YES√ NO			
			COMMENTS							
Calibrated with 25Ft. Ca nort cycled calibration da minute background		1 LAYE	ER MYLAR (0.4mg)			rdance with CP-IN				
			TEMENT OF CERTIFIC			med w/45-0a sourc	e Jig			
Certify that the detector liste edifications. We further certify mage incurred during shipmen		uated for proper	operation prior to shipment an ats are traceable to the National	10.00		acturers published ope Technology (We are	rating not responsible for			
rtified By: Cold	2_	Reviewed By:	Ceppoul	2ms	Date	7/1/0	rky			
rtification Date: 07/01/20			111			2/25/2010	9			

```
BACGROUND PLATEAU 43-68 #134489 (1 LAYER MYLAR) 25FT CABLE 2/24/209
  900
  950
1000
          0
  1050
          0
  1100
          0
  1150
 1200
          1
 1250
          2
 1300
 1350
          2
4
6
 1400
 1450
 1500
          7
 1550
          11
 1600
 1650
          57
 1700
          98
 1750
          213
 1800
          283
-1850
          282
 1900
          301
 1950
 ALPHA PLATEAU TH-230 #119709 2,442DPM
 900
 950
1000
          0
 1050
          0
          0
 1100
 1150
          133
 1200
          291
 1250
          462
 1300
          502
 1350
         510
 1400
         509
 1450
         496
 1500
         530
 BETA PLATEAU TC-99 #099608 21,312 DPM
 1400
         8
 1450
1500
1550
         216
         852
         1805
 1600
 1650
         3033
 1700
         4324
1750
         5189
         5403
1800
- 1850
         5434
1900
         5630
1950
         6182
```

DETECTOR SETUP CHECK LIST REPORT
The following list is stored as detector setup D2 in the Model 2350.
Today's date is 02/25/2009.
The current time of day is: 13:14:49.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE:

Comments:

Model 2350 Serial # = 129395. User I.D. = High Voltage = 1850 volts. Threshold = 40. Window = 1000, Off. Overload Current = 40.0 micro amperes. Scaler Count Time = 60 seconds. Readout Units = counts. Readout Time Base = min. Readout Range Multiplier = Detector Dead Time = auto. Detector Dead Time = 2.210000E-05.
Detector Calibration Constant = 1.000000E+00.
Detector Model = 43-68B. Detector Serial # = 134489. Ratemeter Alarm Setting = 1.000000E+09. Scaler Alarm Setting = 1000000. Integrated Dose Alarm Setting = 1.000000E+09.

Low Count Alarm Setting = X.

Operating Battery Voltage = 5.5 volts. Operating Battery Voltage = 5.5 volts.

### **Ludlum 43-68 #075149 Calibration Certificate**



DETECTOR CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable DETECTOR INFORMATION CUSTOMER INFORMATION Ludlum Customer Name: Duratek Instrument Services Manufacturer: Detector Model: 43-68B Address: 628 Gallaher Rd Kingston, TN 37763 075149 Contact Name: Tony Riggs Serial Number: Customer Purchase Order Work Order **Evaluation Method:** Number: 2009-05619 Number: N/A Source DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION 1) Source Nuclide: C14 Serial Number: 019708 Activity (dpm): 26,045 Certification Date: 11/20/96 Parameter **Precision Test** CPM (Source #1) As Found As Left Count 1 4164 4164 Count 1(Heel) 4164 Count 2 4129 4129 Count 2(Center) 4129 Count 3 3873 3873 Count 3(Toe) 3873 4055.3 4055.3 4055.3 Average Average All counts within ±10% of Average Background (cpm) 335 335 Tolerance PASS **Net Counts** 3720.3 3720.3 Pass/Fail Efficiency 14.3% 14.3% Dead Time (DT): Calibration Constant (CC): Low Sample Activity: **High Sample Activity:** Source #: N/A 22.4E-6 1.0 SCALER INFORMATION DETECTOR INFORMATION Operating Background (cpm) Threshold Model Serial Number **Due Date** Voltage 1750V 2350-1 126198 11/04/09 335 **Detector Setup Report** YES √ NO Barcode Report YES √ NO Voltage Plateau YES √ NO COMMENTS Calibrated in accordance with CP-IN-WI-237 Rev 1 \*\*Calibrated with 25Ft, Cable\*\* 10 minute background 1 LAYER MYLAR (0.4mg) Efficiency determined w/43-68 source jig STATEMENT OF CERTIFICATION We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector). Date: Certified By: MP For T.Riggs Reviewed By: Certification Date: 07/01/2009 Certification Due: 07/01/2010

```
BACKGROUND PLATEAU 43-68 #075149 7/1/09 25 FT CABLE
 900
 950
 1000
          0
 1050
          0
 1100
          0
 1150
          0
 1200
1250
          1
4
 1300
          4
 1350
          3
 1400
 1450
 1500
 1550
          11
17
 1600
 1650
          62
 1700
          115
1750
          239
 1800
          370
 1850
          508
 1900
          670
 1950
          1354
 SOURCE PLATEAU Th230 #129403 AT 18,660DPM
 900
 950
 1000
          0
 1050
          0
 1100
 1150
          51
          1071
 1200
 1250
          2785
 1300
          3801
 1350
          4157
 1400
          4508
 1450
          4602
 1500
          4560
 SOURCE PLATEAU Tc99 #119718 AT 20,520DPM
 1400
 1450
 1500
          18
 1550
         100
 1600
          568
1650
1700
--- 1750
          1649
          3127
          4678
 1800
          5899
 1850
          7536
1900
          9843
```

DETECTOR SETUP CHECK LIST REPORT The following list is stored as detector setup D4 in the Model 2350. Today's date is 07/01/2009. The current time of day is: 15:32:28.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE:

14

Comments:

Model 2350 Serial # = 126198. User I.D. = High Voltage = 1750 volts. Threshold = 1000,Off. Window = 40.0 micro amperes. 60 seconds. Overload Current = Scaler Count Time = Readout Units = counts. Readout Time Base = min. Readout Range Multiplier = auto. Detector Dead Time = 2.240000E-05. Detector Calibration Constant = 1.000000E+00. 43-68B. 075149. Detector Model = Detector Serial # = Detector Serial # = 075149.
Ratemeter Alarm Setting = 1.000000E+09.
Scaler Alarm Setting = 1000000.
Integrated Dose Alarm Setting = 1.000000E+09.
Low Count Alarm Setting = X.
Operating Battery Voltage = 6.0 volts.

### **Ludlum 44-10 #157372 Calibration Certificate**



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable **CUSTOMER INFORMATION** DETECTOR INFORMATION Customer Name: Duratek Instrument Services Manufacturer: Ludlum Address: 628 Gallaher Rd Kingston, TN 37763 Detector Model: 44-10 Contact Name: Tony Riggs Serial Number: 157372 Customer Purchase Work Order **Evaluation Method:** Number: 2009-10108 Order Number: N/A Source DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION 1) Source Nuclide: Cs137 Serial Number: 019454 Activity: 5µCi nominal Certification Date: N/A (Used for Plateau Only) 2) Source Nuclide: Cs137 Serial Number: 049711 Activity: Variable Certification Date: 07/18/08 Scaler Information Precision Test mR/Hr (Source #2) 2350-1 #117573 Count 1 Due Date 04/18/2010 Count 2 2.04 Threshold T=100 (10mV) Count 3 2.03 Cable Length 5ft. Average 2.033 MC-250L #8029 Temp: 19.2°C Tolerance ±10% All counts within ±10% of Average MC-250L #8029 Press: 736mmHg Pass/Fail Pass Humidity Pen #958670 Humidity: 51% MC-250L #8029 Due: 8/26/09 Pen #958670 Due: 4/22/09 Low Sample Activity (400uR/hr): High Sample Activity (2mR/hr) Dead Time (DT): Calibration Constant (CC): Using Source #2 = 71,100 Using Source #2 = 256,238 1.634525E-05 5.904308E+10 ATTACHMENTS DETECTOR DATA: DOSE RATE PROBES (mR/Hr) **Detector Setup Report** YES √ NO Desired Exposure Tolerance ±10% As Found As Left 0.360-0.440 Barcode Report YES √ NO 0.400 0.4030.403 Voltage Plateau: YES √ NO 0.90 - 1.10.961 .961 High Voltage: 1200 1.8-2.2 2.03 2.03 COMMENTS \*\*Detectors set up with a 2350-1 may be used with any 2350-1 provided that the setup parameters are scanned into the 2350-1 prior to use with that specific detector\* Calibrated with 5ft. Cable STATEMENT OF CERTIFICATION We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector). Detector Certified By: ams Reviewed By: \*Certification Due (6mo): 10/21/2009 Certification Date: 04/21/2009 \*certification Due (12mo): 04/21/2010

Calibration due date is dependant on users regulatory requirements.

```
BACKGROUND PLATEAU 44-10 #157372 4/18/2009
           13
25
 700
 750
 800
           45
850
           100
           185
282
900
950
950
1000
1050
           483
           592
1100
           627
1150
1200
1250
           744
           738
755
743
1350 794
SOURCE PLATEAU Cs137 #019454 5uCi
700 17
           17
24
726
750
800
850
           1045
900
           1428
           1857
950
1000
          2212
1050
          2497
1100
          2646
1150
          2727
1200
1250
          2844
2907
1300
          2880
1350
          2894
```

: Enabled

AnignsA otuA

Page 18

DETECTOR SETUP CHECK LIST REPORT The following list is stored as detector setup D3 in the Model 2350. Today's date is 04/21/2009. The current time of day is: 13:56:22.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE:  ${\mathscr M}$ 

Comments:

Model 2350 Serial # = 117573. User I.D. = High Voltage = 1200 volts. 100. 1000,Off. Threshold = Window = Overload Current = 40.0 micro amperes. Scaler Count Time = 12 seconds. Readout Units = Readout Time Base = R. hr. Readout Range Multiplier = auto.
Detector Dead Time = 1.634 Detector Dead Time = 1.634525E-05.

Detector Calibration Constant = 5.904308E+10.

Detector Model = 44-10.

Detector Serial # -44-10. 157372. Detector Serial # = Ratemeter Alarm Setting = 1.000000E+09. Scaler Alarm Setting = 1000000. Integrated Dose Alarm Setting = 1.000000E+09.

### Ludlum 44-10 #192598 Calibration Certificate



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable CUSTOMER INFORMATION DETECTOR INFORMATION Customer Name: Duratek Instrument Services Manufacturer: Ludlum Address: 628 Gallaher Rd Kingston, TN 37763 Detector Model: 44-10 Contact Name: Tony Riggs Serial Number: 192598 Customer Purchase Work Order **Evaluation Method:** Number: 2009-Order Number: N/A Source DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION 1) Source Nuclide: Cs137 Serial Number: 019454 Activity: 5µCi nominal Certification Date: N/A (Used for Plateau Only) 2) Source Nuclide: Cs137 Serial Number: 049711 Activity: Variable Certification Date: 07/18/08 Scaler Information Precision Test mR/Hr (Source #2) 2350-1 #117014 Count 1 2.00 **Due Date** 09/25/09 2.01 Count 2 Threshold T=100 (10mV) Count 3 1.99 Cable Length 5ft. 2.00 Average D-814: 2551 Temp: 22.5 °C All counts within ±10% of Average Tolerance ±10% D-814: 2551 Press: 746mmHg Pass/Fail Pass Humidity Humidity: 35% Low Sample Activity (400uR/hr): High Sample Activity (2mR/hr) Dead Time (DT): Calibration Constant (CC): Using Source #2 = 68,883 Using Source #2 = 256,708 5.648714E+10 1.488005E-05 ATTACHMENTS DETECTOR DATA: DOSE RATE PROBES (mR/Hr) **Detector Setup Report** YES J NO Desired Exposure Tolerance ±10% As Found As Left **Barcode Report** YES J NO 0.400 0.360-0.440 0.401 0.412 Voltage Plateau: YES √ NO 1 0.90-1.10 0.965 0.959 High Voltage: 1000V 2.00 2 1.8-2.2 2.00 COMMENTS \*\*Detectors set up with a 2350-1 may be used with any 2350-1 provided that the setup parameters are scanned into the 2350-1 prior to use with that specific detector\*\* Calibrated with 5ft. Cable STATEMENT OF CERTIFICATION We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector). 4/16/09 Certified By: Reviewed By: Date: \*Certification Due (6mo): 10/15/2009 Certification Date: 04/15/2009 \*Certification Due (12mo): 04/15/2010 Calibration due date is dependant on users regulatory requirements.

```
BACKGROUND PLATEAU 44-10 #192598 4/15/2009
700
750
800
           637
850
900
           701
950
           689
1000
           750
761
710
729
1100
1150
1200
           828
1250
           3452
1300
1300
1300
1300
1350
           11469
11393
7898
7017
           36376
Source Plateau Cs137 #019454 5uCi
700
           5389
           6166
6566
7009
7021
750
800
850
900
          7264
7505
7337
7430
7294
950
1000
1000
1100
           7580
1150
           7455
1150
           7361
1200
1250
           7453
1300
           8022
```

DETECTOR SETUP CHECK LIST REPORT The following list is stored as detector setup D1 in the Model 2350. Today's date is 04/16/2009. The current time of day is: 07:15:32.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE:  $\mathcal{H}$ 

Comments:

Model 2350 Serial # = 117014. User I.D. = High Voltage = 1000 volts. 100. Threshold = 1000, Off. Window = 40.0 micro amperes. 12 seconds. R. Overload Current = Scaler Count Time = Readout Units = Readout Time Base = hr. Readout Range Multiplier = auto.
Detector Dead Time = 1.488 Detector Dead Time = 1.488005E-05. Detector Dead Time = 1.488005E-05.

Detector Calibration Constant = 5.648714E+10.

Detector Model = 44-10.

Detector Serial # = 192598.

Ratemeter Alarm Setting = 1.000000E+09.

Scaler Alarm Setting = 10000000. Scaler Alarm Setting = Integrated Dose Alarm Setting = 1.000000E+09. Low Count Alarm Setting = X.

Operating Battery Voltage = 5.8 volts.

Star Key Ratemeter Function : Start Scaler

Раве 28

### Ludlum 44-10 #227358 Calibration Certificate



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable **DETECTOR INFORMATION CUSTOMER INFORMATION** Customer Name: Duratek Instrument Services Manufacturer: Ludlum Address: 628 Gallaher Rd Kingston, TN 37763 Detector Model: 44-10 Contact Name: Tony Riggs Serial Number: 227358 Customer Purchase Work Order Evaluation Method: Order Number: N/A Number: N/A Source DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION 1) Source Nuclide: Cs137 Serial Number: 019454 Activity: 5µCi nominal Certification Date: N/A (Used for Plateau Only) 2) Source Nuclide: Cs137 Serial Number: 049711 Activity: Variable Certification Date: 07/18/08 Scaler Information Precision Test mR/Hr (Source #2) 2350-1 #82958 Count 1 2.01 **Due Date** 09/12/09 Count 2 1.99 Threshold T=100 (10mV) Count 3 1.98 Cable Length 5ft. 1.99 Average D-814: 2551 Temp: 17.6°C Tolerance ±10% All counts within ±10% of Average D-814: 2551 Press: 746 mmHg Pass/Fail Pass Humidity Low Sample Activity (400uR/hr): High Sample Activity (2mR/hr) Dead Time (DT): Calibration Constant (CC): Using Source #2 = 72,119Using Source #2 = 255,0201.722099E-05 6.033360E+10 ATTACHMENTS DETECTOR DATA: DOSE RATE PROBES (mR/Hr) Detector Setup Report YES ✓ NO Desired Exposure Tolerance ±10% As Found As Left Barcode Report YES √ NO 0.400 0.360-0.440 0.394 0.403YES √ NO Voltage Plateau: 0.90-1.10 0.927 .965 High Voltage: 1200V 2 1.8-2.2 1.94 2.01 COMMENTS \*\*Detectors set up with a 2350-1 may be used with any 2350-1 provided that the setup parameters are scanned into the 2350-1 prior to use with that specific detector\*\* Calibrated with 5ft. Cable STATEMENT OF CERTIFICATION We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector). Certified By: Reviewed By: Date: Certification Date: 05/18/2009 Certification Due: 05/18/2010

```
BACKGROUND PLATEAU 44-10 #227358 5/18/2009
    700
750
             53
             83
    800
850
             162
             282
    900
             520
    950
             693
             765
    1000
    1050
             857
    1100
    1150
             814
1200
    1250
             842
    1300
   1350
             849
    SOURCE PLATEAU Cs137 #019454 5uCi bUTTON
    700
    750
   800
            2381
   850
            3192
   900
            3934
   950
            4397
   1000
            4677
   1050
            4712
   1100
1150
            4891
            4961
→ 1200
            4984
   1250
1300
1350
            5085
4970
5137
```

DETECTOR SETUP CHECK LIST REPORT
The following list is stored as detector setup D1 in the Model 2350.
Today's date is 05/18/2009.
The current time of day is: 15:24:56.

I have verified the list below has NO discrepancies with the DETECTOR SETTINGS TABLE:

Comments:

Model 2350 Serial # = 82958. User I.D. = High Voltage = 1200 volts. Threshold = 100. Window = 1000,Off. Overload Current = 40.0 micro amperes. Scaler Count Time = 12 seconds. Readout Units = R. Readout Time Base = hr. Readout Range Multiplier = auto. Detector Dead Time = 1.722099E-05. Detector Calibration Constant = 6.033360E+10. Detector Model = 44-10. Detector Serial # = 227358. Ratemeter Alarm Setting = 1.000000E+09. Scaler Alarm Setting = 1000000. Integrated Dose Alarm Setting = 1.000000E+09.

Low Count Alarm Setting = X. Operating Battery Voltage = 6.4 volts.

#### Ludlum 2350-1 #80502 Calibration Certificate



incurred during shipment or use of this instrument).

Calibrated By:

Calibration Date: 09/30/2009

**CALIBRATION CERTIFICATE** 

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable **CUSTOMER INFORMATION** INSTRUMENT INFORMATION Customer Name: Duratek Inc. - Instrument Services Facility Manufacturer: Ludium Address: 628 Gallaher Road, Kingston, TN 37763 Model: 2350-1 Serial Number: 80502 Contact Name: Tony Riggs Probe: N/A Serial Number: N/A Customer Purchase Work Order Calibration Method: Order Number: N/A Number: 2009-10385 Electronic and Source INSTRUMENT CALIBRATION INFORMATION Instrument Response Calibration Standard Instrument Range Comments (CPM) Before Calibrated in accordance with After (CPM) Calibration CP-IN-WI-239 Rev 0 Calibration 400 400 398 398 Pulser: 120935 Cal Due: 08/30/10 4,000 4,000 3,985 3,985 DVM: 88020324 Cal Due: 10/31/09 40,000 40,000 39,915 39,915 D-814; 2525 Cal Due: 12/10/09 400,000 400,000 399,138 399,138 Humidity: 992290 Cal Due: 02/03/10 HV Cal Values Desired HV As Found As Left EPPROM Version: 37122N21 (M2350 HV Entry) (Voltmeter) (VDC) (VDC) (VDC) 600 (540-660) 600 609 609 Temp: 22.1°C 1,200 (1,080-1,320) 1,200 1,204 1.204 Pressure: 741 mmHg 1,800 (1,620-1,980) 1,800 1,796 1.796 Humidity: 42% Parameter Tolerance (±10%) As Found As Left Threshold T = 100 10 ± (9 to 11) mVDC 10.2 10.2 Geotropism: SAT ACK/Scroll: SAT Threshold T = 500  $50 \pm (45 \text{ to } 55) \text{ mVDC}$ 46.7 46.7 BAT>4.5: SAT Volume: SAT Threshold T =1000 100 ± (90 to 110) mVDC 98 98 Count: SAT Audio Divide: SAT Window Width W = 100  $10 \pm (9 \text{ to } 11) \text{ mVDC}$ 10 10 Alarms: SAT Lamp: SAT Display-to-mV ratio:  $100\ to\ 10\ mV$ Overload Test: SAT Physical cond: SAT STATEMENT OF CERTIFICATION We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications.

We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage

Calibration Due: 09/30/2010

Reviewed By:

1/30/09

# Ludlum 2350-1 #95359 Calibration Certificate



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337

Fax: (865) 376-8331	This Certificate will be according	mpanied by Calibra	ation Charts or Rea	dings where applicable
CUST	OMER INFORMATION		IN	NSTRUMENT INFORMATION
Customer Name: Duratek	Inc Instrument Services F	acility	Manufacturer:	Ludlum
Address: 628 Gallaher Ro	oad, Kingston, TN 37763		Model: 2350-1	Serial Number: 95359
Contact Name: Tony Rigg	gs		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Orde Number: 20		Calibration Me	thod: Electronic and Source
	INSTRUME	NT CALIBRAT	TION INFORMA	
Instrument Range	Calibration Standard Value	Instrume	nt Response	Comments
(CPM)	(CPM)	Before Calibration	After Calibration	Calibrated in accordance with CP-IN-WI-239 Rev 0
400	400	398	398	Pulser: 120935 Cal Due: 08/30/10
4,000	4,000	3,972	3,972	DVM: 88020324 Cal Due: 10/31/09
40,000	40,000	40,141	40,141	D-814: 2525 Cal Due: 12/10/09
400,000	400,000	397,145	397,145	Humidity: 992290 Cal Due: 02/03/10
HV Cal Values (M2350 HV Entry)	Desired HV (Voltmeter) (VDC)	As Found (VDC)	As Left (VDC)	EPPROM Version: 37122N21
600 (540-660)	600	607	607	Temp: 22.1°C
1,200 (1,080-1,320)	1,200	1,201	1,201	Pressure: 741 mmHg
1,800 (1,620-1,980)	1,800	1,789	1,789	Humidity: 42%
Parameter	Tolerance (±10%)	As Found	As Left	
Threshold T = 100	10 ± (9 to 11) mVDC	10.5	10.5	Geotropism: SAT ACK/Scroll: SAT
Threshold T = 500	50 ± (45 to 55) mVDC	47.5	47.5	BAT>4.5: SAT Volume: SAT
Threshold T =1000	100 ± (90 to 110) mVDC	96	96	Count: SAT Audio Divide: SAT
Window Width W = 100	10 ± (9 to 11) mVDC	10	10	Alarms: SAT Lamp: SAT
Display-to-mV ratio:	100	to 10 mV		Overload Test: SAT Physical cond: SAT
	STATE	MENT OF CE	RTIFICATION	
We Certify that the instrument list We further certify that our Caliba neurred during shipment or use or	ration Measurements are traceable	ected prior to shipme to the National Instit	ent and that it met all t ute of Standards and	the Manufacturers published operating specifications. Technology. (We are not responsible for damage
nstrument Calibrated By: Mile	Revie	wed By:	Malsin	Date: 9/30/09
Calibration Date: 09/30/20	09	2	Calibration Due:	09/30/2010

#### Ludlum 2350-1 #117566 Calibration Certificate



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

Calibrated By:

Calibration Date: 09/28/2009

This Certificate will be accompanied by Calibration Charts or Readings where applicable **CUSTOMER INFORMATION** INSTRUMENT INFORMATION Customer Name: Duratek Inc. - Instrument Services Facility Manufacturer: Ludlum Address: 628 Gallaher Road, Kingston, TN 37763 Model: 2350-1 Serial Number: 117566 Contact Name: Tony Riggs Probe: N/A Serial Number: N/A Customer Purchase Work Order Calibration Method: Order Number: N/A Number: 2009-10385 Electronic and Source INSTRUMENT CALIBRATION INFORMATION Instrument Response Calibration Standard Instrument Range Comments Value (CPM) Before Calibrated in accordance with After (CPM) CP-IN-WI-239 Rev 0 Calibration Calibration 400 400 398 398 Pulser: 120935 Cal Due: 08/30/10 4,000 4,000 3,981 3,981 DVM: 88020324 Cal Due: 10/31/09 40,000 40,000 39,805 D-814: 2525 39.805 Cal Due: 12/10/09 400,000 400,000 398,437 398,437 Humidity: 992290 Cal Due: 02/03/10 HV Cal Values Desired HV As Found As Left EPPROM Version: 37122N21 (M2350 HV Entry) (Voltmeter) (VDC) (VDC) (VDC) 600 (540-660) 600 603 24.9°C 603 Temp: 1,200 (1,080-1,320) 1.200 1,195 1.195 Pressure: 734 mmHg 1,800 (1,620-1,980) 1,800 1,785 1,785 Humidity: 23% Parameter Tolerance (±10%) As Found As Left 10 ± (9 to 11) mVDC ACK/Scroll: SAT Threshold T = 100 10.4 10.4 Geotropism: SAT Threshold T = 500  $50 \pm (45 \text{ to } 55) \text{ mVDC}$ BAT>4.5: SAT 46.5 46.5 Volume: SAT Threshold T=1000  $100 \pm (90 \text{ to } 110) \text{ mVDC}$ 92 92 Count: SAT Audio Divide: SAT Window Width W = 100 10 ± (9 to 11) mVDC 10 Alarms: SAT Lamp: SAT Display-to-mV ratio: 100 to 10 mV Overload Test: SAT Physical cond: SAT STATEMENT OF CERTIFICATION We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument). Instrument

Reviewed By:

## Ludlum 2350-1 #126198 Calibration Certificate



**CALIBRATION** CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTO	MER INFORMATION		IN	STRUMENT INFORMATION
Customer Name: Duratek	Inc Instrument Services Fa	cility	Manufacturer:	Ludlum
Address: 628 Gallaher Roa	nd, Kingston, TN 37763		Model: 2350-1	Serial Number: 126198
Contact Name: Tony Riggs	3		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 20		Calibration Met	thod: Electronic and Source
	INSTRUMEN	NT CALIBRAT	TION INFORMA	ATION
Instrument Range	Calibration Standard	Instrume	nt Response	Comments
(CPM)	Value (CPM)	Before Calibration	After Calibration	Calibrated in accordance with CP-IN-WI-239 Rev 0
400	400	398	398	Pulser: 120935 Cal Due: 09/11/09
4,000	4,000	3,978	3,978	DVM: 93950304 Cal Due: 03/27/09
40,000	40,000	39,782	39,782	MC-250L: 8029 Cal Due: 08/26/09
400,000	400,000	398,255	398,255	Humidity: 992290 Cal Due: 03/28/09
HV Cal Values (M2350 HV Entry)	Desired HV (Voltmeter) (VDC)	As Found (VDC)	As Left (VDC)	EPPROM Version: 37122N21
600 (540-660)	600	603	603	Temp: 21.4°C
1,200 (1,080-1,320)	1,200	1,193	1,193	Pressure: 747 mmHg
1,800 (1,620-1,980)	1,800	1,781	1,781	Humidity: 33%
Parameter	Tolerance (±10%)	As Found	As Left	
Threshold T = 100	10 ± (9 to 11) mVDC	10.3	10.3	Geotropism: SAT ACK/Scroll: SAT
Threshold T = 500	50 ± (45 to 55) mVDC	49.7	49.7	BAT>4.5: SAT Volume: SAT
Threshold T =1000	100 ± (90 to 110) mVDC	99	99	Count: SAT Audio Divide: SAT
Window Width W = 100	10 ± (9 to 11) mVDC	10	10	Alarms: SAT Lamp: SAT
Display-to-mV ratio:	100	) to 10 mV		Overload Test: SAT Physical cond: SAT
	STATE	EMENT OF CE	RTIFICATION	
We Certify that the instrument li We further certify that our Calib incurred during shipment or use	ration Measurements are traceable	pected prior to shipn to the National Inst	nent and that it met all itute of Standards and	the Manufacturers published operating specifications. I Technology. (We are not responsible for damage
Instrument Calibrated By:	Paul' Rovie	wed By:	Jeff Das	einse Date: \$0/4/08
Calibration Date: 11/04/08			Calibration Due	0114/08

Attachments Page 31 of 84

#### Ludlum 2350-1 #117573 Calibration Certificate

Calibration due date is dependant on users regulatory requirements.



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337

Fax: (865) 376-8331 This Certificate will be accompanied by Calibration Charts or Readings where applicable CUSTOMER INFORMATION INSTRUMENT INFORMATION Customer Name: Duratek Inc. - Instrument Services Facility Manufacturer: Ludlum Address: 628 Gallaher Road, Kingston, TN 37763 Model: 2350-1 Serial Number: 117573 Probe: N/A Serial Number: Contact Name: Tony Riggs Work Order Customer Purchase Calibration Method: Number: 2009-10108 Electronic and Source Order Number: N/A INSTRUMENT CALIBRATION INFORMATION Instrument Response Calibration Standard Instrument Range Comments Value (CPM) Calibrated in accordance with Before After (CPM) Calibration Calibration CP-IN-WI-239 Rev 1 400 400 400 400 Pulser: 246163 Cal Due: 11/04/09 4,000 4,000 4,012 4,012 DVM: 97960214 Cal Due: 02/05/10 40,000 40,000 40,011 40,011 MC-250L: 8029 Cal Due: 08/26/09 400,000 400,000 400,589 400,589 Humidity: 958670 Cal Due: 04/22/09 Desired HV HV Cal Values As Found As Left EPPROM Version: 37122N21 (M2350 HV Entry) (Voltmeter) (VDC) (VDC) (VDC) 600 (540-660) 26.5°C 600 605 605 Temp: 1,200 (1,080-1,320) 1,200 1,203 1,203 Pressure: 744 mmHg 1.800 (1.620-1.980) 1,800 1,797 1,797 Humidity: 30% Tolerance (±10%) Parameter As Found As Left Threshold T = 100  $10 \pm (9 \text{ to } 11) \text{ mVDC}$ 10.5 10.5 Geotropism: SAT ACK/Scroll: SAT 50 ± (45 to 55) mVDC BAT>4.5: SAT Volume: SAT Threshold T = 50055 55 Audio Divide: SAT Threshold T =1000  $100 \pm (90 \text{ to } 110) \text{ mVDC}$ 108 Count: SAT 108 Window Width W = 100  $10 \pm (9 \text{ to } 11) \text{ mVDC}$ 10 Alarms: SAT Lamp: SAT 10 Display-to-mV ratio: 100 to 10 mV Overload Test: SAT Physical cond: SAT STATEMENT OF CERTIFICATION We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument). Instrument Calibrated By: Reviewed By: Date: \*Calibration Due (6mo): 10/18/2009 Calibration Date: 04/18/2009 \*Calibration Due (12mo): 04/18/2010

# Ludlum 2350-1 #126183 Calibration Certificate



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

CUSTO	MER INFORMATION		IN	STRUMENT INFOR	MATION
Customer Name: Duratek	Inc Instrument Services Fa	cility	Manufacturer:	Ludlum	
Address: 628 Gallaher Roa	d, Kingston, TN 37763		Model: 2350-1	Serial Number: 126	183
Contact Name: Tony Riggs			Probe: N/A	Serial Number: N/A	A
Customer Purchase	Work Order		Calibration Met	hod:	
Order Number: N/A	Number: 20	09-10505		Electronic	
	INSTRUMEN	NT CALIBRAT	TON INFORMA	ATION	
Instrument Range	Calibration Standard	Instrume	nt Response	Con	nments
(CPM)	Value (CPM)	Before Calibration	After Calibration	Calibrated in accorda CP-IN-WI-239 Rev 1	
400	400	400	400	Pulser: 151067	Cal Due: 04/30/10
4,000	4,000	3,986	3,986	DVM: 97960214	Cal Due: 02/05/10
40,000	40,000	39,945	39,945	D-814: 3590	Cal Due: 07/09/10
400,000	400,000	399,461	399,461	Humidity: 992290	Cal Due: 02/03/10
HV Cal Values (M2350 HV Entry)	Desired HV (Voltmeter) (VDC)	As Found (VDC)	As Left (VDC)	CP Firmware Version	n: 37122N21
600 (540-660)	600	596	596	Temp: 23.6°	С
1,200 (1,080-1,320)	1,200	1,179	1,179	Pressure: 744 m	mHg
1,800 (1,620-1,980)	1,800	1,764	1,764	Humidity: 28%	
Parameter	Tolerance (±10%)	As Found	As Left		
Threshold T = 100	10 ± (9 to 11) mVDC	9.7	9.7	Geotropism: SAT	ACK/Scroll: SAT
Threshold T = 500	50 ± (45 to 55) mVDC	48.4	48.4	BAT>4.5: SAT	Volume: SAT
Threshold T =1000	100 ± (90 to 110) mVDC	95.4	95.4	Count: SAT	Audio Divide: SAT
Window Width W = 100	10 ± (9 to 11) mVDC	9.7	9.7	Alarms: SAT	Lamp: SAT
Display-to-mV ratio:	*As Found Ratio 100 to 10	mV As Left Ra	tio 100 to 10 mV	Overload Test: SAT	Physical cond: SAT
	STATE	EMENT OF CE	RTIFICATION		
	sted above was calibrated and insp ration Measurements are traceable	ected prior to shipm	ent and that it met all	the Manufacturers published	
Instrument Calibrated By:	. 1-	wed By:	Self Dulen	Date:	12/1/09
Calibration Date: 12/01/200	09		Calibration Due	: 12/01/2010	

Page 1 of 1

# Ludlum 2350-1 #117555 Calibration Certificate



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337

CUSTO	OMER INFORMATION		IN	STRUMENT INFORMATION
Customer Name: Duratek	Inc Instrument Services Fa	acility	Manufacturer:	Ludlum
Address: 628 Gallaher Ros	ad, Kingston, TN 37763		Model: 2350-1	Serial Number: 117555
Contact Name: Tony Rigg	s		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Orde Number: 20		Calibration Met	thod: Electronic and Source
	INSTRUME	NT CALIBRAT	TION INFORMA	ATION
Instrument Range	Calibration Standard	Instrume	nt Response	Comments
(CPM)	Value (CPM)	Before Calibration	After Calibration	Calibrated in accordance with CP-IN-WI-239 Rev 1
400	400	397	397	Pulser: 120935 Cal Due: 09/11/09
4,000	4,000	3,977	3,977	DVM: 88020324 Cal Due: 10/31/09
40,000	40,000	39,641	39,641	MC-250L: 8029 Cal Due: 08/26/09
400,000	400,000	396,771	396,771	Humidity: 958670 Cal Due: 04/22/09
HV Cal Values (M2350 HV Entry)	Desired HV (Voltmeter) (VDC)	As Found (VDC)	As Left (VDC)	EPPROM Version: 37122N21
600 (540-660)	600	601	601	Temp: 19.2°C
1,200 (1,080-1,320)	1,200	1,189	1,189	Pressure: 736 mmHg
1,800 (1,620-1,980)	1,800	1,774	1,774	Humidity: 51%
Parameter	Tolerance (±10%)	As Found	As Left	
Threshold T = 100	10 ± (9 to 11) mVDC	10.6	10.6	Geotropism: SAT ACK/Scroll: SAT
Threshold T = 500	50 ± (45 to 55) mVDC	49.7	49.7	BAT>4.5: SAT Volume: SAT
Threshold T =1000	100 ± (90 to 110) mVDC	100	100	Count: SAT Audio Divide: SAT
Window Width W = 100	10 ± (9 to 11) mVDC	10	10	Alarms: SAT Lamp: SAT
Display-to-mV ratio:	100	) to 10 mV		Overload Test: SAT Physical cond: SAT
	STATI	EMENT OF CE	RTIFICATION	
	ration Measurements are traceable			the Manufacturers published operating specifications Technology. (We are not responsible for damage
nstrument	Revie	wed By:	1 hot	Date: 4/21/09
alibration Date: 04/21/20			*Calibration Du	e (6mo): 10/21/2009

# Ludlum 177 #45602 with Ludlum 44-9 Probe #176080 Calibration Certificate



CALIBRATION CERTIFICATE

Duratek Instrument Services 628 Gallaher Road Kingston, TN 37763 Phone: (865) 376-8337 Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION INSTRUMENT INFORM

uratek Instrument Services Manufacturer: Ludlum

	JSTOMER INFORMATION		INST	RUMENT INFORM	<b>AATION</b>
Customer Name: Dur	atek Instrument Services		Manufacturer: L	udlum	
Address: 628 Galiaher	Road, Kingston, TN 37763		Model: 177	Serial Number:	45602
Contact Name: Tony I	<del></del>	· · · · · · · · · · · · · · · · · · ·	Probe: 44-9		176080
Customer Purchase Order Number: N/A	Work	Order er: 2009-10385	Calibration Method	d: Electronic and Sour	••
0.007.7.007.7.77	· · · · · · · · · · · · · · · · · · ·		ON INFORMATIC		
		<del>.,</del>	ent Response	T	
	Calibration Standard Value	(±	10%)		ıments
		Before Calibration	After Calibration	Calibrated in accor CP-IN-WI 223 Rev	
X 1	100	100	100	Pulser: 120935	Cal Due: 08/30/10
X 1	250	250	250	DVM: 88020324	Cal Due: 10/31/09
X I	400	400	400	D-814: 2525	Cal Due: 12/10/09
X 10	1,000	1,000	1,000	Humidity: 992290	Cal Due: 02/03/10
X 10	2,500	2,500	2,500	Temp: 19.9 °C Pressure: 742 mmH	( <b>-</b>
X 10	4,000	4,000	4,000	Humidity: 44%	g
X 100	10,000	10,000	10,000	Geotropism: SAT	F/S Resp: SAT
X 100	25,000	25,000	25,000	BAT: SAT	HV Test: SAT
X 100	40,000	40,000	40,000	Volume: SAT	Sensitivity: SAT
X 1000	100,000	100,000	100,000	Alarm Set: SAT	Reset: SAT
X 1000	250,000	250,000	250,000		
X 1000	400,000	400,000	400,000	Precision Test	
Mechanical Zero	0	0	0	Reading 1: 2,600 Reading 2: 2,650	
Efficiency	Determination (Determined at ~	1/8" with Model 180	0-2 Jig)	Reading 3: 2,600	
Instrument Range	Source ID and Value	Net cpm	Efficiency	Mean: 2,617	⊠ sat □ unsat
EFF X1	Tc-99#119720 at 2,562dpm	310	12.1%		
EFF X10	Tc-99#119718 at 20,520dpm	2,560	12.5%	Background: 40cpm	
EFF X100	Tc-99#069507 at 237,960dpm	28,460	12.0%	Limited Use: X1K se	cale for information
High Voltage	900V(± 5%)	900V	900V	only. Use with GM	probe.
	STATE	MENT OF CERT	TIFICATION		
We Certify that the instrume We further certify that our C incurred during shipment or	nt listed above was calibrated and inspe alibration Measurements are traceable t use of this instrument).	cted prior to shipment o the National Institute	and that it met all the Ma of Standards and Technol	unufacturers published op ology. (We are not respor	erating specifications. sible for damage
Instrument				······································	
Calibrated By:	Review	ed By:	Makinso Calibration Due: 10/	Date: /	10/1/09
Calibration Date: 10/01/	2009	0 \$	Calibration Due: 10/	01/2010	

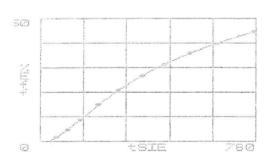
## Packard Tri-Carb #401663 Calibration Information

```
C14 IPA DATA PROCESSED - 25-Oct-2009 08:26
    C14 Eff (0-156 keV) = 96.36 %
C14 CHI SQUARE IPA DATA PROCESSED - 25-Oct-2009 08:37
    C14 Chi Square = 18.20
H3 IPA DATA PROCESSED - 25-Oct-2009 08:38
H3 Eff (0-18.6 keV) = 61.17 %
H3 CHI SQUARE IPA DATA PROCESSED - 25-Oct-2009 08:49
H3 Chi Square = 31.82
BKG IPA DATA PROCESSED - 25-Oct-2009 09:50
Bkg (0-18.6 keV) = 15.32 cpm
Bkg (0-156 keV) = 23.95 cpm

WARNING: Questionable C14 Background value - Please view historic data

C14 E^2/B (1-156 keV) = 472.85
H3 E^2/B (1-18.6 keV) = 244.91
```

```
Page #1
25 Oct 2009 06:22 ALPHA/BETA - 1.09
                                                                     User : EaglePicher / ES
Protocol #:13
                                H-3 Quench Stds
Time: 30.00
Data Mode: Count Standards
                     Nuclide: H-3 UG
Background Subtract: None
         LL UL LCR 25%
                              BKG
Region A: 0.0 - 18.6 0
                       0.5
                              0,00
Quench Indicator: tSIE/AEC
 Ext Std Terminator: Count
ES# 060303 192,578 dpm
Coincidence Time(ns): 18
Delay Before Burst(ns): Normal
          TIME
                    CPMA
                              SIS tSIE FLAG
          1.56 103061 16.001 772.73
 13
          1.75 91873.0 13.918 638.27
1.94 82602.1 12.505 539.42
          2.22 72361.1 11.241 448.47
```



2.59 61910.2 10.058 369.15

3.35 47882.0 8.758 282.71 4.67 34284.2 7.705 210.27 8.05 19883.8 6.671 142.84

5.883 98.931

5.300 57.110

14.80 10813.9

30.00 3787.87

1.3

1.3

tSIE %Eff 772.73 53.52 638.27 47.71 539.42 42.89 448.47 37.57 369.15 32.15 282.71 24.86 210.27 17.80 142.82 10.33 98.93 5.62 57.11 1.97

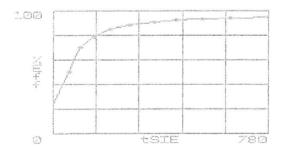
25 Oct 2009 07:50	ALPHA/BETA - 1.09	Page	#1
Protocol #:26	C-14 Quench Stds	User : EaglePiche	r / ES
Time: 30.00 Data Mode: Count Standards	Nuclide: C-14 UG		

Data Mode: Count Standards Nuclide: C Background Subtract: None

LL UL LER 25% BKB Region A: 0.0 - 156 0 0.5 0.00

Quench Indicator: tSIE/AEC
Ext Std Terminator: Count
ES# 060302 138,100 dpm
Coincidence Time(ns): 18
Delay Before Burst(ns): Normal
Protocol Data Filename: C:\EP\PROT.DAT
Count Data Filename: C:\EP\SDATA25.BAT

色料	PID	5#	TIME	CPMA	SIS	tSIE	FLAG
26	2	1	1.22	131264	124.79	777.84	8
26	2	2	1.24	129715	103.27	640.93	5
36	2	3	1.24	129133	88,280	542.43	S
26	2	4	1.26	127608	73.703	449.67	8
36	2	(3)	1.28	125367	61.226	367.62	8
26	22	6	1,31	122180	47.084	278,49	8
26	22	7	1.37	117336	36,194	208.85	8
26	2	8	1.48	108250	26.653	145.63	8
36	2	9	1.67	96137.1	19,439	98.834	S
26	2	1.0	2.31	69347.7	12.716	57,617	Ξ



tSIE %Eff 777.84 95.05 640.93 93.93 542.43 93.51 449.67 92.40 367.62 90.78 278.49 88.47 208.85 84.96 145.63 78.39 98.83 69.61 57.62 50.22 **Attachment 7.3:** Beta Instrument Static and Scan MDC Worksheets

Static and Scan MDC Worksheet for 43-68 Gas Flow Proportional Detectors

$MDC_{beta} = \frac{t_s}{t_s} + \frac{R_b}{\sqrt{t_s}} = \frac{R_b}{\sqrt{t_s}} + \frac{R_b}{t_b}$ $MDC_{beta} = \frac{t_s}{t_s} + \frac{R_b}{\sqrt{t_s}} + \frac{R_b}{t_b}$ $\frac{E_i * E_s * A}{\sqrt{t_s}} + \frac{A}{t_b}$ $\frac{RSTF}{\sqrt{t_s}} = 80502 \text{ Instrument Serial Number}$ $\frac{L_b}{t_s} = \frac{1.00}{1.98} \text{ Background Count Time (min)}$ $\frac{L_b}{t_s} = \frac{1.138}{1.28} \text{ Area of Delector Sindin Number}$ $\frac{L_b}{t_s} = \frac{1.28}{1.28} \text{ Area of Delector Time (min)}$ $\frac{R_b}{t_s} = \frac{1.28}{0.252} \text{ Delector Sindin Number}$ $\frac{L_b}{t_s} = \frac{1.28}{0.0450} \text{ Background Count Time (min)}$ $\frac{R_b}{t_s} = \frac{1.28}{0.0450} \text{ Background Count Time (min)}$ $\frac{R_b}{t_s} = \frac{1.28}{0.0450} \text{ Background Count Rate (cpm)}$ $\frac{R_b}{t_s} = \frac{1.00}{0.0450} \text{ Background Count Rate (cpm)}$ $R_b$					
Section 18.12   Section 4.8.12   Section 4.8.12   Section 4.8.12   Section 4.8.12   Section 4.8.12   Section 4.8.12   Section 7.5   Section 4.8.12   Section 8.12   Secti	MDC, =	$\frac{2.71}{t_s} + 3.29 * \sqrt{\left(\frac{R_b}{t_s} + \frac{R_b}{t_b}\right)}$	MDC Sca		
Inputs	beta	*			* 5
80502         Instrument Serial Number         Instraction Serial Nu	CS	-FO-PR-001 Rev. 1, Section 4.8.1.2	0	S-FO-PR-0	31 Rev. 1, Section 4.8.3.3 to 4.8.3.5
80502         Instrument Serial Number         INST#=         80502           95523         Detector Serial Number         d' = 1.38           265         Background Count Rate (cpm)         p = 0.50           1         Background Count Time (min)         p = 0.50           1         Sample Count Time (min)         Scan ε <sub>i</sub> = 0.25           126         Area of Detector (cm²)         Scan ε <sub>i</sub> = 0.25           0.143         Detector Efficiency (4π)         Scan Speed = 8.8           0.05         Backscatter         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         R <sub>B</sub> = 2.65           0.05         Backscatter         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         R <sub>B</sub> = 2.65           0.05         Backscatter         Scan Speed = 8.8           0.26         Surface Efficiency (2π)         Scan Speed = 8.8           0.26         Surface Efficiency (2π)         Scan Speed = 8.8           0.063         Total Detection Efficiency           1.00         Scan MDC = 1.26           1.00         Scan MDC = 3.187		Inputs			luputs
95523         Detector Serial Number         DET#=         95523           265         Background Count Rate (cpm)         d' = 1.38           1         Background Count Time (min)         p = 0.50           126         Area of Detector (cm²)         Scan ε <sub>s</sub> = 0.25           126         Area of Detector Efficiency (4π)         Scan Speed = 8.8           0.043         Detector Efficiency (2π)         Scan Speed = 8.8           0.05         Backscatter         Scan Speed = 8.8           0.05         Surface Efficiency (7π)         Scan Speed = 8.8           0.05         Surface Efficiency (radionuclide detectability)         Detector Width = 8.8           0.05         Surface Efficiency (radionuclide detectability)         Detector Width = 8.8           0.06         Source efficiency (radionuclide detectability)         A = 1.66           0.06         Surface Efficiency (radionuclide detectability)         Bris (1.00           0.06 <td></td> <td>Instrument Serial Number</td> <td>=#LSNI</td> <td>80502</td> <td>Instrument Serial Number</td>		Instrument Serial Number	=#LSNI	80502	Instrument Serial Number
265         Background Count Rate (cpm)         d" = 1.38           1         Background Count Time (min)         p = 0.50           1         Sample Count Time (min)         p = 0.50           126         Area of Defector (cm²)         Scan ε <sub>s</sub> = 0.25           0.143         Detector Efficiency (4π)         Scan Speed = 8.8           0.05         Backscatter         Scan Speed = 8.8           0.272         Detector Efficiency (radionuclide detectability)         Scan Speed = 8.8           0.25         Surface Efficiency (radionuclide detectability)         b <sub>i</sub> = 1.00           0.05         Source efficiency (radionuclide detectability)         b <sub>i</sub> = 1.416667           0.0681         Total Detection Efficiency         A = 126           0.0683         A = 126           Formula, enter 2π efficiency data directly if available         scan MDC = 3,187           Change if neccesary         Scan MDC = 3,187		Detector Serial Number	DET#=	95523	Detector Serial Number
1 Background Count Time (min) 1 Sample Count Time (min) 1 Sample Count Time (min) 1 Sample Count Time (min) 1 Sample Count Time (min) 1 Scan ε <sub>s</sub> = 0.25 0.143 Detector Efficiency (4π) 0.05 Backscatter 0.272 Detector Efficiency (2π) 0.272 Detector Efficiency (2π) 0.272 Detector Efficiency (2π) 0.272 Detector Efficiency (2π) 0.272 Detector Efficiency (2π) 0.272 Detector Efficiency (2π) 0.272 Detector Efficiency 0.272 Detector Efficiency 0.272 Detector Efficiency 0.273 Detector Efficiency 0.274 As a 1.00 0.0681 Total Detection Efficiency 0.0681 T		Background Count Rate (cpm)	= ,p	1.38	Index of Sensitivity
126 Area of Delector (cm²) 127 Detector Efficiency (4π) 128 Backscatter 129 Scan ε <sub>s</sub> = 0.25 1.00 1.005 Backscatter 0.272 Detector Efficiency (2π) 1.00 Source efficiency (2π) 1.00 Source efficiency (radionuclide detectability)	t <sub>0</sub> = 1	Background Count Time (min)	II Q	0.50	Surveyor Efficiency
126         Area of Detector (cm²)         Scan ε₃ = 0.25           0.143         Detector Efficiency (4π)         Scan Speed = 8.8           0.05         Backscatter         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         R <sub>B</sub> = 265           1.00         Source efficiency (radionuclide detectability)         Detector Width = 8.8           1.00         Source efficiency (radionuclide detectability)         A= 1.26           0.0681         Total Detection Efficiency           914         dpm/100 cm²         A= 1.26           Formula, enter 2π efficiency data directly if available         s <sub>t</sub> = 0.0613           Change if neccesary         Scan MDC = 3,187	t <sub>s</sub> = 1	Sample Count Time (min)	Scan 8	0.25	Scanning Instrument Efficiency (21)
0.143         Detector Efficiency (4π)         Scan Speed = 1.00           0.05         Backscatter         8.272         Detector Efficiency (2π)         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         R <sub>B</sub> = 265         265           1.00         source efficiency (radionuclide detectability)         Detector Width = 8.8         4.416667           0.0681         Total Detection Efficiency         A = 1.26         A = 1.26           914         dpm/100 cm²         St. = 0.0613         A = 1.00           Formula, enter 2π efficiency data directly if available         Scan MDC = 3.187         A = 1.00           Change if neccesary         Scan MDC = 3.187         Date: 0.032 / A		Area of Detector (cm²)	Scan 8,s=	0.25	Scanning Surface Efficiency
0.05         Backscatter         Scan Speed = 8.8           0.272         Detector Efficiency (2π)         R <sub>B</sub> = 265           1.00         source efficiency (radionuclide detectability)         Detector Width = 8.8           0.0681         Total Detection Efficiency           914         dpm/100 cm²           Enter data         s, = 0.0613           Formula, enter 2π efficiency data directly if available         s, = 0.0613           Change if neccessary         Scan MDC = 3,187		Detector Efficiency (4π)	ဟိ	1.00	source efficiency (radionuclide detectabili
0.252         Detector Efficiency (2π)         Scan Speed = 8.8           1.00         source efficiency (radionuclide detectability)         R <sub>B</sub> = 265           1.00         source efficiency (radionuclide detectability)         Detector Width = 8.8           0.0681         Total Detection Efficiency           914         dpm/100 cm²           Enter data         st₁ = 0.0613           Formula, enter 2π efficiency data directly if available         i = 1.00           Change if neccesary         Scan MDC = 3,187		Backscatter			43-68
0.25         Surface Efficiency         R <sub>B</sub> = 265         265<		Detector Efficiency (2π)	Scan Speed =	8.8	(cm/sec)
1.00 source efficiency (radionuclide detectability)  Outputs  A = 1.26  A = 1.26  A = 1.26  Outputs  Stan MDC = 1.00  Stan MDC = 3,187  Date:   O   3.32		Surface Efficiency	R <sub>B</sub> =	265	Background Count Rate (cpm)
Outputs         Outputs         0.0681       Total Detection Efficiency         914       dpm/100 cm²         Enter data       εt = 0.0613         Formula, enter 2π efficiency data directly if available       i = 1.00         Change if neccesary       Scan MDC = 3,187         viewed by:       Author 2 miles         Date:       10/32/4	n.	source efficiency (radionuclide detectability)		4.416667	Background counts per observation interv
Outputs       0.0681     Total Detection Efficiency       914     dpm/100 cm²       Enter data     ε₁ = 0.0613       Formula, enter 2π efficiency data directly if available     i = 1.00       Change if neccesary     Scan MDC = 3,187       viewed by:     Au C E E			Detector Width =	8.8	width of detector in direction of scan (cm)
0.0681       Total Detection Efficiency         914       dpm/100 cm²         Enter data       ε₁ = 0.0613         Formula, enter 2π efficiency data directly if available       i = 1.00         Change if neccessary       Scan MDC = 3,187         viewed by:       Yau C E E		Outputs	A=	126	Area of Detector (cm²)
914     dpm/100 cm²       Enter data     ε <sub>t</sub> = 0.0613       Formula, enter 2π efficiency data directly if available     i = 1.00       Change if neccesary     Scan MDC = 3,187       viewed by:     Au C E E		Total Detection Efficiency			Outputs
nnter $2\pi$ efficiency data directly if available i = 1.00  Scan MDC = 3,187  MALL ELL Date: $ 0/32 $		dpm/100 cm <sup>2</sup>			43-68
neccesary  Here 2π efficiency data directly if available i = 1.00  Scan MDC = 3,187  Scan MDC = 3,187  Date: 10/32/4	Enter data		11 33	0.0613	Total Detection Efficiency
Scan MDC = 3,187   Scan MDC = 3,187   Scan MDC = 1,187   Scan MDC =	Formula, e	inter $2\pi$ efficiency data directly if available	i)	1.00	Observation interval in seconds (detected width divided by the scan speed)
Gan Co El	Change if	neccesary	Scan MDC =	3,187	dpm/100 cm <sup>2</sup>
	Reviewed by:	Bull Ely	Date:	(ce)0	60

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Static and Scan MDC Worksheet for 43-68 Gas Flow Proportional Detectors

$E_{t} * E_{t}						Scan MDC (43-68)
S-FO-PR-001 Rev. 1, Section 4.8.1.2  Inputs  Inputs  Instrument Serial Number Detector Serial Number Background Count Time (min) Sample Count Time (m	MAN	r	$\frac{R_b}{t_s} +$	MDC	ij	$d * \sqrt{b_i} * \frac{60}{i}$
Inputs           95359         Instrument Serial Number         INST#=         95359           119337         Detector Serial Number         DET#=         119337           282.1         Background Count Rate (cpm)         d' = 1.38           1         Sample Count Time (min)         p = 0.50           1         Sample Count Time (min)         Scan ε <sub>i</sub> = 0.34           126         Area of Detector (cm²)         Scan ε <sub>i</sub> = 0.25           0.197         Detector Efficiency (4π)         Scan Speed = 8.8           0.05         Backscatter         Scan Speed = 8.8           0.25         Surface Efficiency         Scan Speed = 8.8           1.00         source efficiency (4π)         Scan Speed = 8.8           1.00         source efficiency (2π)         Detector Width = 8.8	MD	beta =	$\mathcal{E}_i * \mathcal{E}_s * \frac{A}{100}$ 3-FO-PR-001 Rev. 1, Section 4.8.1.2	9	m CS-FO-PR-0	$\sqrt{p}$ * $\varepsilon_i$ * $\varepsilon_s$ * $\frac{A}{100}$
95359         Instrument Serial Number         INST#=         95359           119337         Detector Serial Number         DET#=         119337           282.1         Background Count Rate (cpm)         d' =         1.38           1         Background Count Time (min)         p =         0.50           1         Sample Count Time (min)         Scan ε <sub>1</sub> =         0.34           1         Area of Detector (cm²)         Scan ε <sub>1</sub> =         0.25           0.197         Detector Efficiency (4π)         Sc =         1.00           0.05         Backscatter         Scan Speed =         8.8           0.25         Surface Efficiency (2π)         Scan Speed =         8.8           1.00         source efficiency (radionuclide detectability)         Detector Width =         8.8           0.25         A :701667         A =         1.26			Inputs			lonite
119337         Detector Serial Number         DET#= 119337           282.1         Background Count Rate (cpm)         d' = 1.38           1         Background Count Time (min)         p = 0.50           126         Area of Detector (cm²)         Scan ε₁ = 0.34           0.197         Detector Efficiency (4π)         Scan sea = 0.25           0.05         Backscatter         Scan Speed = 8.8           0.375         Detector Efficiency (2π)         Scan Speed = 8.8           0.25         Surface Efficiency (radionuclide detectability)         b₁ = 4.701667           0.025         Surface efficiency (radionuclide detectability)         Detector Width = 8.8           0.026         Area of Detector Width = 8.8	#LSNI		Instrument Serial Number	#LINST#=	95359	Instrument Serial Number
282.1         Background Count Rate (cpm)         d' = 1.38           1         Background Count Time (min)         p = 0.50           1         Sample Count Time (min)         c = 0.34           126         Area of Detector (cm²)         Scan ε <sub>s</sub> = 0.25           0.197         Detector Efficiency (4π)         S <sub>c</sub> = 1.00           0.05         Backscatter         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         R <sub>B</sub> = 282.1           1.00         source efficiency (radionuclide detectability)         b <sub>i</sub> = 4.701667           1.00         source efficiency (radionuclide detectability)         Detector Width = 8.8	DET#		Detector Serial Number	#LEDET#=	119337	Detector Serial Number
1 Background Count Time (min)  1 Sample Count Time (min)  126 Area of Detector (cm²)  0.197 Detector Efficiency (4π)  0.05 Backscatter  0.375 Detector Efficiency (2π)  0.05 Surface Efficiency  0.25 Surface Efficiency  1.00 Source efficiency (radionuclide detectability)  0.01	R <sub>B</sub> =		Background Count Rate (cpm)	= ,p	1.38	Index of Sensitivity
126 Area of Detector (cm²)  127 Area of Detector (cm²)  128 Area of Detector (cm²)  129 Backscatter  120 Backscatter  120 Scan ε <sub>8</sub> = 0.25  120 Scan Speed = 8.8  120 Scan Speed = 1.00	to=	-	Background Count Time (min)	= d	0.50	Surveyor Efficiency
126Area of Detector (cm²)Scan $\varepsilon_s$ = $\frac{0.25}{1.00}$ 0.197Detector Effciency ( $4\pi$ ) $S_c$ = $\frac{1.00}{1.00}$ 0.05BackscatterScan Speed = $\frac{8.8}{8}$ 0.25Surface Efficiency ( $2\pi$ ) $R_B$ = $\frac{282.1}{1.00}$ 0.25Surface Efficiency (radionuclide detectability) $b_i$ = $\frac{4.701667}{1.26}$ 0.00Detector Width = $\frac{8.8}{8}$	= s	-	Sample Count Time (min)	Scan e	0.34	Scanning Instrument Efficiency (2±)
0.197 Detector Efficiency $(4\pi)$ 0.05 Backscatter 0.375 Detector Efficiency $(2\pi)$ 0.25 Surface Efficiency (radionuclide detectability)  Outputs  Outputs  Outputs	A =		Area of Detector (cm²)	Scan E <sub>s</sub> =	0.25	Scanning Surface Efficiency
0.05         Backscatter           0.375         Detector Efficiency (2r)           0.25         Surface Efficiency           1.00         source efficiency (radionuclide detectability)           Detector Width = 8.8           A = 126	E.42	E.	Detector Efficiency (4n)	S	1.00	Source efficiency (radioning detectoristic)
0.25 Surface Efficiency (2π)  0.25 Surface Efficiency  1.00 source efficiency (radionuclide detectability)  Detector Width = A = A	BS =		Backscatter			43-68
1.00 source efficiency (radionuclide detectability)  Outputs  A = Outputs  A = A = A = A = A = A = A = A = A = A	= i3		Detector Efficiency (2π)	Scan Speed =	8.8	(cm/sec)
1.00 source efficiency (radionuclide detectability) b <sub>i</sub> = Outputs A =	11 S		Surface Efficiency	Re=	282.1	Background Count Rate (com)
Outputs A =	S <sub>0</sub> =		source efficiency (radionuclide detectability)	= iq	4.701667	Background counts per observation interv
Outputs A= 126				Detector Width =	8.8	width of detector in direction of scan (cm)
		-	Outputs	A=	126	Area of Detector (cm²)
0.0938	E. 1.3	2	Total Detection Efficiency			Outputs
$MDC = 684   dpm/100 cm^2$ 43-68	MDC =	_	-			43-68
Enter data		Enter data		= 13		Total Detection Efficiency
onter $2\pi$ efficiency data directly if available i = 1.00		Formula,	anter $2\pi$ efficiency data directly if available	=1		Observation interval in seconds (detector width divided by the scan speed)
Change if neccesary Scan MDC = 2,387   dpm/100 cm <sup>2</sup>		Change if	neccesary	Scan MDC =	2,387	dpm/100 cm <sup>2</sup>
Reviewed by. Faul ER	Rei	viewed by:	F. 52	9	0.1.0/0	

Static and Scan MDC Worksheet for 43-68 Gas Flow Proportional Detectors

$MDC_{brace} = \frac{1}{i_{S}} + 3.29 * \sqrt{\frac{R_{b} + R_{b}}{i_{S}}}$ $RDC_{brace} = \frac{1}{i_{S}} + \frac{1.7566}{100}$ $CSFO-PR_{OUT} Rev. 1, Section 4.8.3.2$ $R_{b} = \frac{1.1366}{2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0$		_			97
$\mathcal{E}_i * \mathcal{E}_s * \frac{A}{100}$ FO-PR-001 Rev. 1, Section 4.8.12  Instrument Serial Number Instrument Serial Number Instrument Serial Number Belector Serial Number Belector Serial Number Belector Serial Number Belector Serial Number Belector Serial Number Belector Serial Number Belector Serial Number Belector Serial Number Count Time (min) Belector (cm²) Belector Efficiency ( $4\pi$ ) Belector Efficiency ( $4\pi$ ) Belector Efficiency ( $2\pi$ ) Scan $8_i = 0.25$ Scan Speed = 8.8 Surface Efficiency (radionucide detectability) Belector Width = 8.8  Outputs  Outputs  Outputs  Outputs  Fig. 0.0673  Detector Width = 8.8  Fig. 0.0673  Fig. 0.0673  Fig. 0.0673  Fig. 0.0673		$\frac{2.71}{t_s} + 3.29 * $		3	$d^* \sqrt{b_i} * \frac{60}{i}$
Inputs   Inputs	MDC beta =	£, * £, *	8	ue	$\sqrt{p} * \varepsilon_i * \varepsilon_s * \frac{A}{100}$
Inputs   Inputs		SS-FO-PR-001 Rev. 1, Section 4.8.1.2		CS-FO-PR-0	11 Rev. 1, Section 4.8.3.3 to 4.8.3.5
117566   Instrument Serial Number   117566   Instrument Serial Number   117566   Serial Number   1262   138					Inpute
91028         Detector Serial Number         DET#=         91028           262.1         Background Count Rate (cpm)         d' = 1.38           1         Background Count Time (min)         p = 0.50           126         Area of Detector (cm²)         Scan s₁ = 0.27           126         Area of Detector Efficiency (4π)         Scan Speed = 8.8           0.157         Detector Efficiency (2π)         Scan Speed = 8.8           0.299         Detector Efficiency (radionuclide detectability)         Detector Width = 4.368333           0.299         Detector Efficiency (radionuclide detectability)         b₁ = 4.368333           0.0748         Total Detection Efficiency         A = 126           1.00         Source efficiency data directly if available         A = 126           6 change if neccesary         Scan MDC = 2.887			=#LSNI	117566	Instrument Serial Number
262.1         Background Count Rate (cpm)         d' = 138           1         Background Count Time (min)         p = 0.50           126         Area of Detector (cm²)         Scan s₁ = 0.27           126         Area of Detector Efficiency (4π)         Scan s₂ = 0.25           0.157         Detector Efficiency (4π)         Scan Speed = 8.8           0.299         Detector Efficiency (radionuclide detectability)         Rs = 262.1           0.299         Detector Efficiency (radionuclide detectability)         A = 1.36           0.0748         Total Detection Efficiency           828         dpm/100 cm²         A = 1.26           Enter data         Formula, enter 2π efficiency data directly if available         scan MDC = 2.887           Change if neccesary         Scan MDC = 2.887			DET#=	91028	Detector Serial Number
1         Background Count Time (min)         p = 0.50           126         Area of Detector (cm²)         Scan ε <sub>s</sub> = 0.25           0.157         Detector Efficiency (4π)         Scan ε <sub>s</sub> = 0.25           0.05         Backscatter         Scan Speed = 88           0.25         Surface Efficiency (2π)         Scan Speed = 88           0.25         Surface Efficiency (radionuclide detectability)         Scan Speed = 88           0.05         Backscatter         Scan Speed = 88           0.05         Surface Efficiency (radionuclide detectability)         Scan Speed = 88           0.0748         Total Detection Efficiency         A : 3.68333           Detector Width = 8.8         A : 3.68333           Enter data         A : 126           Formula, enter 2π efficiency data directly if available         Scan MDC = 2.887           Change if neccesary         Scan MDC = 2.887		Background Count Rate (cpm)	= ,p	1.38	Index of Sensitivity
126         Area of Detector (cm²)         Scan ε₃ = 0.25           0.157         Detector Efficiency (4π)         Scan Speed = 0.25           0.05         Backscatter         Scan Speed = 8.8           0.29         Detector Efficiency (2π)         Scan Speed = 262.1           0.29         Detector Efficiency (radionuclide detectability)         b₁ = 4.368333           0.0748         Total Detection Efficiency         A = 126           0.0748         Total Detection Efficiency         A = 126           828         dpm/100 cm²         A = 126           Enter data         Enter data         Eq. (C. Mange if neccesary           Change if neccesary         Scan MDC = 2.887	to = 1	Background Count Time (min)	= d	0.50	Surveyor Efficiency
126         Area of Detector (cm²)         Scan ε <sub>s</sub> = 0.25           0.05         Backscatter         Scan Speed = 8.8           0.299         Detector Efficiency (2π)         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         Scan Speed = 8.8           0.25         Surface Efficiency (2π)         Scan Speed = 8.8           0.0748         Total Detection Efficiency         A = 126           0.0748         Total Detection Efficiency         A = 126           828         dpm/100 cm²         A = 126           Enter data         Enter data         Et = 0.0673           Formula, enter 2π efficiency data directly if available         Scan MDC = 2.887           Viewed by:         Total Detection Efficiency         Scan MDC = 2.887		Sample Count Time (min)	Scan e;=	0.27	Scanning Instrument Efficiency (2#)
0.05         Backscatter         Scan Speed = 1.00           0.299         Detector Efficiency (2π)         Scan Speed = 88           0.25         Surface Efficiency (2π)         R <sub>B</sub> = 262.1           1.00         source efficiency (radionuclide detectability)         b = 4.368333           0.0748         Total Detection Efficiency         A = 126           828         dpm/100 cm²         A = 126           Enter data         Enter data         Enter data           Formula, enter 2π efficiency data directly if available         scan MDC = 2.887           Viewed by:         Exter Communication of the context of th		Area of Detector (cm²)	Scan s <sub>s</sub> =	0.25	Scanning Surface Efficiency
0.05         Backscatter         Scan Speed = 88           0.299         Detector Efficiency (2π)         R <sub>B</sub> = 262.1           1.00         source efficiency (radionuclide detectability)         b = 4.368333           0.0748         Total Detection Efficiency         A = 126           828         dpm/100 cm²         A = 126           Enter data         Enter data         Enter data           Formula, enter 2π efficiency data directly if available change if neccessary         i = 1.00           Change if neccessary         Scan MDC = 2.887           Viewed by:         A = 126	1	Detector Efficiency (4π)	S,	1.00	source efficiency (radioniclide detectability
0.259         Detector Efficiency (2π)         Scan Speed = 88           0.25         Surface Efficiency (radionuclide detectability)         R <sub>B</sub> = 262.1           Dutputs           0.0748         Total Detection Efficiency           828         dpm/100 cm²         A = 126           Enter data         ε <sub>t</sub> = 0.0673           Formula, enter 2π efficiency data directly if available         scan MDC = 2,887           Viewed by:         Red. C. R.		Backscatter			43-68
0.25         Surface Efficiency (radionuclide detectability)         R <sub>B</sub> = 262.1           Outputs         Detector Width = 4.368333           0.0748         Total Detection Efficiency         Formula, enter 2π efficiency data directly if available         ε <sub>t</sub> = 0.0673           Formula, enter 2π efficiency data directly if available change if neccessary         Scan MDC = 2,887	53	Detector Efficiency (2π)	Scan Speed =	8.8	(cm/sec)
1.00 source efficiency (radionuclide detectability)  Outputs  Outputs  Outputs  Outputs  Outputs  Outputs  Outputs  A = 4.368333  Detector Width = 8.8  A = 126  A = 126  Outputs  Reference of ficiency data directly if available change if neccessary  Change if neccessary  Scan MDC = 2,887  Date: 13/36/69	11	Surface Efficiency	R <sub>B</sub> =	262.1	Background Count Rate (cnm)
Outputs         0.0748       Total Detection Efficiency         828       dpm/100 cm²         Enter data         Enter data         Formula, enter 2π efficiency data directly if available         Change if neccesary         Scan MDC = 2,887         Viewed by:         Date:         Date:       13/30/69	11	source efficiency (radionuclide detectability)	= 'Q	4.368333	Background counts per observation interv
Outputs 0.0748A = $126$ 126828 828 Enter data Formula, enter $2\pi$ efficiency data directly if available Change if neccessary $e_t =$ $0.0673$ $i =$ Formula, enter $2\pi$ efficiency data directly if available Change if neccessary $i =$ $1.00$ Scan MDC = $2.887$			Detector Width =	8.8	width of detector in direction of scan (cm)
0.0748       Total Detection Efficiency         828       dpm/100 cm²         Enter data       εt = 0.0673         Formula, enter 2π efficiency data directly if available       i = 1.00         Change if neccesary       Scan MDC = 2,887         viewed by:       Acc         Date:       12/3/9/99	-		Α	126	Area of Detector (cm²)
Enter data  Enter data  Enter data  Enter data  Formula, enter $2\pi$ efficiency data directly if available  Change if neccessary  Scan MDC = 2,887  Viewed by: $\mathcal{H}_{CLC}$					Outputs
enter 2n efficiency data directly if available  neccessary  Scan MDC = 2,887   March C 88  Date: 13/30/09					43-68
enter $2\pi$ efficiency data directly if available i = 1.00 scan MDC = 2,887 here is a scan MDC = 1.00 for the scan MDC = 1.00 scan MDC = 1.00 for the	Enter dat	a	= 13		Total Detection Efficiency
neccesary    Scan MDC = 2,887    Pour C Eq.   Date:  2 30 09	Formula,	enter $2\pi$ efficiency data directly if available	11	7	Observation interval in seconds (detective width divided by the scan speed)
Paul C En	Change ii	neccesary	Scan MDC =		dpm/100 cm <sup>2</sup>
	Reviewed by	T	Date: _	2/30/08	

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Static and Scan MDC Worksheet for 43-68 Gas Flow Proportional Detectors

	Static MDC (43-68)		Ĭ	Scan MDC (43-68)
JUN	$\frac{2.71}{t_s} + 3.29 * \sqrt{\frac{R_b}{t_s} + \frac{R_b}{t_b}}$	MDC scan	ij	$d^{*}\sqrt{b_i}*\frac{60}{i}$
Deta -	$\mathcal{E}_i * \mathcal{E}_s * \frac{A}{100}$			$\sqrt{p * \varepsilon_i * \varepsilon_s * \frac{A}{100}}$
	LOU CS-FO-PR-001 Rev. 1, Section 4,8.1,2		SS-FO-PR-00	CS-FO-PR-001 Rev. 1, Section 4.8.3.3 to 4.8.3.5
	Inputs			Inputs
11756	6 Instrument Serial Number	=#LSNI	117566	Instrument Serial Number
DET#= 13448	9 Detector Serial Number	DET#=	134489	Detector Serial Number
R <sub>B</sub> = 368	Background Count Rate (cpm)	=,0	1.38	Index of Sensitivity
to= 4	Background Count Time (min)	e d	0.50	Surveyor Efficiency
ts= 1	Sample Count Time (min)	Scan 8	0.27	Scanning Instrument Efficiency (2 <sub>π</sub> )
A = 126	Area of Detector (cm²)	Scan s <sub>s</sub> =	0.25	Scanning Surface Efficiency
$\epsilon_{4\pi} = 0.159$	Detector Efficiency (4π)	S	1.00	source efficiency (radionuclide detectability)
BS = 0.05				43-68
E <sub>1</sub> = 0.303		Scan Speed =	8.8	(cm/sec)
11	Surface Efficiency	R <sub>B</sub> =	368	Background Count Rate (cpm)
S <sub>c</sub> = 1.00	source efficiency (radionuclide detectability)	= 'q	6.133333	6.133333 Background counts per observation interval
	Č	Detector Width =	8.8	width of detector in direction of scan (cm)
		A=	126	Area of Detector (cm <sup>2</sup> )
				Outputs
MDC = 964	dpm/100 cm <sup>2</sup>			43-68
Enter data	ıta	# 3°	0.0681	Total Detection Efficiency
Formula,	, enter $2\pi$ efficiency data directly if available	=1	1.00	Observation interval in seconds (detector width divided by the scan speed)
Change	Change if neccesary	Scan MDC =	3,378	dpm/100 cm <sup>2</sup>
Reviewed by	1. Jan 563	Date: /	Date: 12/340	~

Static and Scan MDC Worksheet for 43-68 Gas Flow Proportional Detectors

$MDC_{beta} = rac{2.71}{t_s} + 3.29 * \sqrt{rac{R_b}{t_s} + rac{R_b}{t_b}}$ $\mathcal{R}_{beta} = rac{t_s}{\epsilon_i * \epsilon_s * rac{A}{100}}$ cs-Fo-PR-001 Rev. 1, Section 4.8.1.2	MDC Scan	" = -	$a_{nn} = \frac{d^{1*}\sqrt{b_{i}} * \frac{60}{i}}{\sqrt{p} * \varepsilon_{i} * \varepsilon_{s} * \frac{A}{100}}$ CS-FO-PR-001 Rev. 1, Section 4.8.3.3 to 4.8.3.5
Inputs			Inputs
INST#= 126198 Instrument Serial Number	=#LSNI	126198	Instrument Serial Number
75149	DET#=	75149	Detector Serial Number
R <sub>B</sub> = 335 Background Count Rate (cpm)	a' =	1.38	Index of Sensitivity
t <sub>b</sub> = 1 Background Count Time (min)	= d	0.50	Surveyor Efficiency
t <sub>s</sub> = 1 Sample Count Time (min)	Scan ɛ <sub>i</sub> =	0.25	Scanning Instrument Efficiency (2π)
A = 126 Area of Detector (cm²)	Scan s <sub>s</sub> =	0.25	Scanning Surface Efficiency
ε <sub>4π</sub> = 0.143 Detector Efficiency (4π)	S	1.00	source efficiency (radionuclide detectability)
BS = 0.05 Backscatter			43-68
$\epsilon_i = 0.272$ Detector Efficiency (2 $\pi$ )	Scan Speed =	8.8	(cm/sec)
ε <sub>s</sub> = 0.25 Surface Efficiency	R <sub>B</sub> =	335	Background Count Rate (cpm)
S <sub>c</sub> = 1.00 source efficiency (radionuclide detectability)	p = 1	5.583333	5.583333 Background counts per observation interval
	Detector Width =	8.8	width of detector in direction of scan (cm)
	A=	126	Area of Detector (cm²)
			Outputs
MDC = 1,024   dpm/100 cm <sup>2</sup>			43-68
Enter data	e = 1	0.0613	Total Detection Efficiency
Formula, enter $2\pi$ efficiency data directly if available	<u></u>	1.00	Observation interval in seconds (detector width divided by the scan speed)
Change if neccesary	Scan MDC =	3,583	dpm/100 cm <sup>2</sup>
Reviewed by: Fruit SG	Date: 13/30/	ORETE	

**Attachment 7.4:** COMPASS Survey Plans and Survey Location Calculations

## **SU001 West Building**

COMPASS Report Page 1 of 2



## Survey Plan Summary

Site Name: EaglePicher Planner(s): P Ely

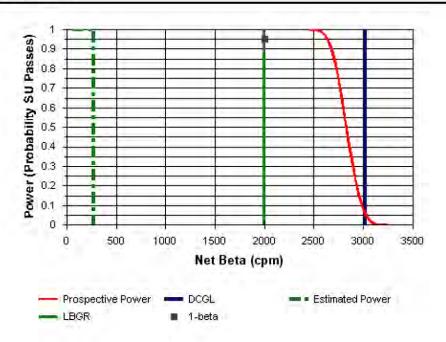
Survey Unit Name: SU001 Interior West Area

Comments: N/A

#### Statistical Design Details

Area (m²):	858	Classification:	3
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	348
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	14.
LBGR (cpm/100 cm <sup>2</sup> ):	2,000	Estimated Conc. (cpm/100 cm²):	273
Alpha:	0.050	Estimated Power:	1.0
Poto:	0.050		

#### **Prospective Power Curve**



COMPASS Report Page 2 of 2

#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDC <sup>a</sup>	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 348

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm <sup>2</sup> )
SU	273	348	1,584

Report Created 09/24/2009 1037 (COMPASS v1.1.0)

Survey Package 001 Interior Areas Class 3

> Total Floor Grids: 869 Floor Survey Points:

Ceiling Survey Points: 40 Ceiling locations above floor locations Wall grid locations were made on the wall Wall Survey Points:

nearest to the floor location

Floor/Ceiling Loca	
Grid Number	X (n)
1	1
2	18
3	50
4	81
5	120
6	125
7	143
8	168
9	193
10	199
11	213
12	237
13	242
14	272
15	289
16	299
17	304
18	305
19	328
20	329
21	339
22	403
23	431
24	477
25	502
26	570
27	597
28	607
29	614
30	628
31	637
32	664
33	687
34	693
35	709
36	733
37	735
38	777
39	856
40	860

Location X(n) indicates the grid number and Y indicates the elevation above the floor for

Note random survey locations have been sorted to place survey locations in an ordered sequence.

EaglePicher Survey Point Locations.xls, SU001 (Interior)

11/11/2009

## **SU002 East Building**

COMPASS Report Page 1 of 2



## **Survey Plan Summary**

Site Name: EaglePicher Planner(s): P Ely

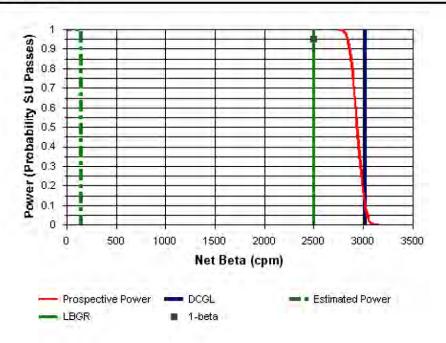
Survey Unit Name: SU002 Interior East Area

Comments: N/A

#### Statistical Design Details

Area (m²):	684	Classification:	3
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	173
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	13
LBGR (cpm/100 cm <sup>2</sup> ):	2,500	Estimated Conc. (cpm/100 cm²):	144
Alpha:	0.050	Estimated Power:	1.0
Reta:	0.050		

## **Prospective Power Curve**



COMPASS Report Page 2 of 2

#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDCa	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 173

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm²)
SU	144	173	1,167

Report Created 09/24/2009 1023 (COMPASS v1.1.0)

Survey Package 002 Interior Areas Class 3

> Total Floor Grids: 683 Floor Survey Points:

Ceiling Survey Points: 40 Ceiling locations above floor locations Wall grid locations were made on the wall 40 Wall Survey Points:

nearest to the floor location

Flace (On iliano Las	-41
Floor/Ceiling Loo	
Grid Number	X (n)
1	15
2	50
3	68
4	92
5	117
6	120
7	134
8	141
9	153
10	155
11	161
12	168
13	174
14	177
15	193
16	247
17	257
18	277
19	310
20	319
21	332
22	370
23	381
24	391
25	400
26	436
27	452
28	457
29	489
30	490
31	522
32	529
33	562
34	573
35	583
36	587
37	593
38	621
39	642
40	674
-10	07-1

Location X(n) indicates the grid number and Y indicates the elevation above the floor for

Note random survey locations have been sorted to place survey locations in an ordered sequence.

EaglePicher Survey Point Locations.xls, SU002 (Interior)

11/11/2009

# **SU003 Outside Wall**

COMPASS Report Page 1 of 2



## **Survey Plan Summary**

Site Name: EaglePicher Planner(s): P Ely

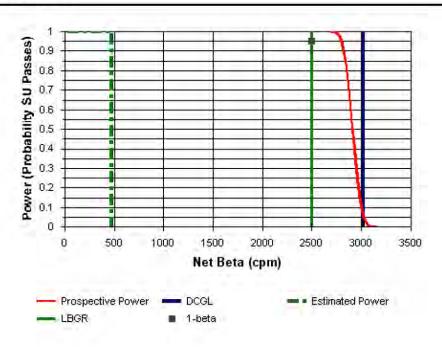
Survey Unit Name: SU003 Exterior Walls

Comments: N/A

#### Statistical Design Details

Area (m²):	1,484	Classification:	3
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	202
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	14
LBGR (cpm/100 cm <sup>2</sup> ):	2,500	Estimated Conc. (cpm/100 cm²):	476
Alpha:	0.050	Estimated Power:	1.0
Beta:	0.050		

## **Prospective Power Curve**



COMPASS Report Page 2 of 2

#### **Gross Beta Efficiency Data**

Instrument Description: Lundlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDCa	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 202

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm <sup>2</sup> )
SU	476	202	2,072

Report Created 09/24/2009 1059 (COMPASS v1.1.0)

Survey Package 003 Building Class 3 Exterior Walls (Random Survey Locations)

X (Distance along wall) 264 meters

Survey Point	Survey I X (m)	Location Y (m)	
1	6	4.0	
2	11	4.2	
3	14	3.4	
4	19	6.9	South Wall 8m
5	21	5.6	
6	24	6.2	
7	29	6.2	
8	45	0.8	
9	48	1.4	
10	52	0.1	South Wall 4.5m
11	54	1.6	
12	68	1.3	
13	7 <del>6</del> –	2.3	South Brick Screen Wall 3.2m
14	84	1.9	
15	108	1.8	East Wall @ High Roof 3.3m
16	112	2.5	g ü
17	125	1.0	
18	127	2.5	East Wall 4.5m
19	140	2.3	East vvali 4.5m
20	165	4.4	
21	167	0.8	
22	173	0.3	
23	182	0.4	North Wall 4.5m
24	189	1.9	Notti Wali 4.5III
25	189	2.2	
26	192	1.2	
27	200	2.1	
28	203	7.1	
29	209	2.3	North Wall 8m
30	212	1.2	Notti Wall offi
31	215	2.1	
32	224	6.3	
33	225	1.9	
34	227	6.3	
35	231	2.7	
36	233	7.3	West Wall 8m
37	247	1.9	vvest vvali offi
38	248	2.0	
39	256	2.8	
40	262	5.6	

Wall locations start a SW Corner at ground level. X indicates the distance around the building counter clockwise and Y indicates the elevation above ground.

Note random survey locations have been sorted to place survey locations in an ordered sequence.

EaglePicher Survey Point Locations.xls, SU003 (Ext Walls)

11/11/2009

## **SU004 High Roof**

COMPASS Report Page 1 of 2



## Survey Plan Summary

Site Name: EaglePicher Planner(s): P Ely

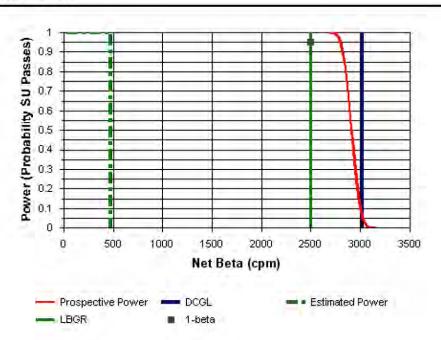
Survey Unit Name: SU004 High Roof

Comments: N/A

#### Statistical Design Details

Area (m²):	915	Classification:	2
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	202
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	14
LBGR (cpm/100 cm <sup>2</sup> ):	2,500	Estimated Conc. (cpm/100 cm²):	476
Alpha:	0.050	Estimated Power:	1.0
Reta:	0.050		

## **Prospective Power Curve**



COMPASS Report Page 2 of 2

#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDCa	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 202

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm <sup>2</sup> )
SU	476	202	2,072

Report Created 09/24/2009 1127 (COMPASS v1.1.0)

Survey Package 004 High Roof Roof Class 2 Area

> X (Max): 23.5 meters Y (Max): 42.16 meters A (Area): 991 m<sup>2</sup>

Actual Survey Area: 914.6 m²
Required Survey Points: 30 8% percent void area

N (Points): 32 Estimated Minimum Points

 $L = \left[\frac{A}{N}\right]^{1/2}$ 

for square grid

**L=** 5.6 meters (distance between measurement points)

X (Origin): 21.6 initially generated random number Y (Origin): 2.0 initially generated random number

Number of rows: 8 Number of columns: 4

Survey	Survey	Location	Row
Point	X	Y	
Starting Point (1)	21.6	2.0	1
2	16.0	2.0	
3	10.4	2.0	
4	4.8	2.0	
5	21.6	7.6	2
6	16.0	7.6	
7	10.4	7.6	
8	4.8	7.6	
9	21.6	13.2	3
10	16.0	13.2	
11	10.4	13.2	
12	4.8	13.2	
13	21.6	18.8	4
14	16.0	18.8	
15	10.4	18.8	
16	4.8	18.8	
17	21.6	24.4	5
18	16.0	24.4	
19	10.4	24.4	
20	4.8	24.4	
21	21.6	30.0	6
22	16.0	30.0	
23	10.4	30.0	
24	4.8	30.0	
25	21.6	35.6	7
26	16.0	35.6	
27	10.4	35.6	
28	4.8	35.6	
29	21.6	41.2	8
30	16.0	41.2	
31	10.4	41.2	
32	4.8	41.2	

EaglePicher Survey Point Locations.xls, SU004 High Roof

11/11/2009

# **SU005 Low Roof**

COMPASS Report Page 1 of 2



## Survey Plan Summary

Site Name: EaglePicher Planner(s): P Ely

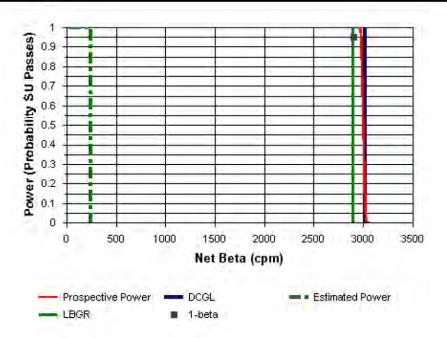
Survey Unit Name: SU005 Low Roof

Comments: N/A

#### Statistical Design Details

Area (m²):	1,376	Classification:	3
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	42
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	14
LBGR (cpm/100 cm <sup>2</sup> ):	2,900	Estimated Conc. (cpm/100 cm²):	244
Alpha:	0.050	Estimated Power:	1.0
Reta:	0.050		

## **Prospective Power Curve**



COMPASS Report Page 2 of 2

#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDCa	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 42

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm <sup>2</sup> )
SU	244	42	1,501

Report Created 09/24/2009 1301 (COMPASS v1.1.0)

Survey Package 005 Low Roof Roof Class 3 Area

X (East:West) 118 feet
Y (North:South) 119 feet
(RANDOM LOCATIONS SORTED)

Survey	Survey Location		
Point	X (ft)	Y (ft)	
1	6	110	
2	10	14	
3	16	103	
4	20	33	
5	22	78	
6	24	111	
7	27	110	
8	28	65	
9	28	104	
10	29	55	
11	30	114	
12	32	16	
13	35	99	
14	37	104	
15	38	82	
16	39	105	
17	43	68	
18	47	51	
19	52	102	
20	58	43	
21	66	49	
22	68	13	
23	71	113	
24	72	37	
25	79	21	
26	93	61	
27	95	33	
28	109	104	
29	113	6	
30	117	3	

Location X indicates the East:West location and Y indicates the North:South location relative to the southwest corner.

Note random survey locations have been sorted to place survey locations in an ordered sequence.

## **SU006 Mezzanine Ceiling**

COMPASS Report Page 1 of 2



## **Survey Plan Summary**

Site Name: EaglePicher Planner(s): P Ely

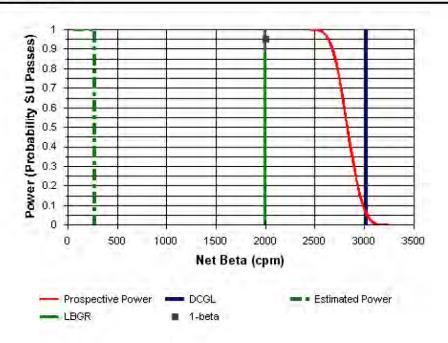
Survey Unit Name: SU006 Ceiling Above Cell Block

Comments: N/A

#### Statistical Design Details

Area (m²):	614	Classification:	3
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	348
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	14.
LBGR (cpm/100 cm <sup>2</sup> ):	2,000	Estimated Conc. (cpm/100 cm²):	273
Alpha:	0.050	Estimated Power:	1.0
Beta:	0.050		

## **Prospective Power Curve**



#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

L	Contaminant	HTDCa	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
	C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 348

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm <sup>2</sup> )
SU	273	348	1,584

Report Created 09/24/2009 1316 (COMPASS v1.1.0)

Survey Package 006 Ceiling Above Labs Ceiling Class 3 Area

X (East:West) 70.5 feet
Y (North:South) 101 feet
(RANDOM LOCATIONS SORTED)

Survey	Surve	ey Location
Point	X (ft)	Y (ft)
1	1	19
2	2	75
3	3	19
4	7	14
5	8	69
6	14	18
7	16	17
8	16	29
9	18	72
10	19	73
11	20	42
12	20	83
13	22	31
14	28	23
15	32	13
16	32	98
17	34	34
18	35	49
19	37	96
20	42	30
21	46	34
22	49	63
23	52	4
24	52	53
25	55	3
26	57	82
27	59	18
28	61	49
29	61	68
30	65	81

Location X indicates the East:West location and Y indicates the North:South location relative to the southwest corner.

Note random survey locations have been sorted to place survey locations in an ordered sequence.

#### **SU007 Out Building**

COMPASS Report Page 1 of 2



#### **Survey Plan Summary**

Site Name: EaglePicher Planner(s): P Ely

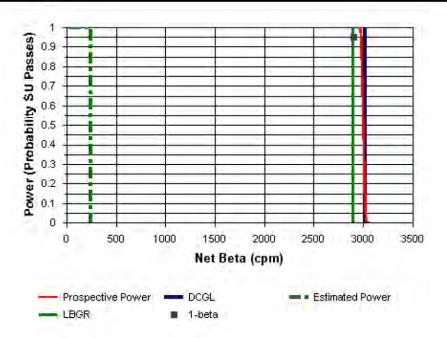
Survey Unit Name: SU007 Out Buildings

Comments: N/A

#### Statistical Design Details

Area (m²):	413	Classification:	3
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	42
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	14.
LBGR (cpm/100 cm <sup>2</sup> ):	2,900	Estimated Conc. (cpm/100 cm²):	244
Alpha:	0.050	Estimated Power:	1.0
Reta:	0.050		

#### **Prospective Power Curve**



#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDC <sup>a</sup>	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 42

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm <sup>2</sup> )
SU	244	42	1,501

Report Created 09/30/2009 0756 (COMPASS v1.1.0)

Survey Package 007 Out Building Class 3 Area

X (Distance) 190 feet
Y (Distance or Elevation) 15 feet

(RANDOM LOCATIONS SORTED)

Survey	Surve	ey Location
Point	X (ft)	Y (ft)
1	3	7
2	5	1
3	7	14
4	11	7
5	12	11
6	19	1
7	19	3
8	23	3
9	30	4
10	37	4
11	37	12
12	46	12
13	47	11
14	49	5
15	51	15
16	56	1
17	99	4
18	104	11
19	113	2
20	120	5
21	124	12
22	133	13
23	134	6
24	139	1
25	143	9
26	144	7
27	148	3
28	148	10
29	159	12
30	162	3
31	173	8
32	177	9
33	177	10
34	189	9

Location X indicates the lineal distance relative to the southwest corner (see map).

Note random survey locations have been sorted to place survey locations in an ordered sequence.

#### **SU009 Soil Areas**

COMPASS Report Page 1 of 2



#### Survey Plan Summary

Site Name: EaglePicher Soil

Planner(s): P Ely

Survey Unit Name: SU009 Surface Soil Sampling

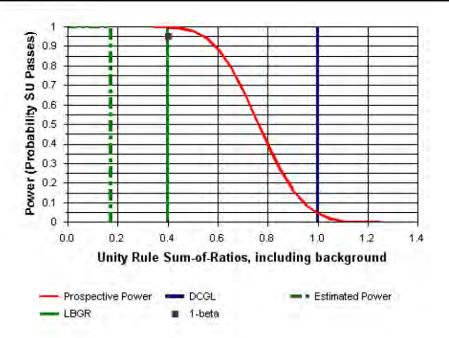
Comments: N/A

#### Statistical Design Details

Area (m²):	22,874	Classification:	3
Selected Test:	Sign	Estimated Sigma (SOR):	0.50
DCGL (SOR):	1	Sample Size (N):	22
LBGR (SOR):	0.40	Estimated Conc. (SOR):	0.17
Alpha:	0.050	Estimated Power:	1.0
Beta:	0.050		

NOTE: SOR = Sum-of-Ratios

#### **Prospective Power Curve**



#### **Measured Contaminant Details**

Contaminant	DCGLw (pCi/g)	Modified DCGLw (pCi/g)	Survey Unit Estimate (Mean ± 1-Sigma) (pCi/g)	Reference Area Estimate (Mean ± 1-Sigma) (pCi/g)
C-14	60	N/A	9.9 ± 30	1.5 ± 1.5
H-3	2,100	N/A	$6.8 \pm 30$	$0.08 \pm 0.26$

Report Created 09/25/2009 1026 (COMPASS v1.1.0)

Survey Package 009 Entire Site Class 3 Area

X (East:West) 741 feet
Y (North:South) 395 feet
Total Area 292,695 ft²
Real Area 246,212 ft²
% Real Area 84%
Sample Points 36

(RANDOM LOCATIONS SORTED)

Survey	Surve	ey Location
Point	X (ft)	Y (ft)
1	3	49
2	90	357
3	97	46
4	103	226
5	112	202
6	172	212
7	188	156
8	190	67
9	232	121
10	233	62
11	234	309
12	240	1
13	244	216
14	274	322
15	309	214
16	312	112
17	314	279
18	328	176
19	328	346
20	329	294
21	340	259
22	361	328
23	371	126
24	384	142
25	397	260
26	427	354
27	429	240
28	432	116
29	464	212
30	483	20
31	513	116
32	569	325
33	582	253
34	606	97
35	641	98
36	733	106

Location X indicates the East:West location and Y indicates the North:South location relative to the southwest corner.

Note random survey locations have been sorted to place survey locations in an ordered sequence.

#### **SU010 Mechanical Room Floor**

COMPASS Report Page 1 of 2



#### **Survey Plan Summary**

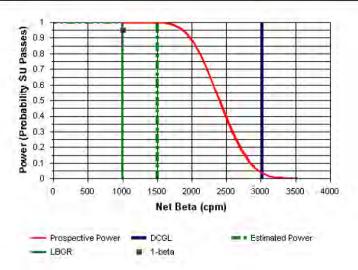
Site Name: EaglePicher Planner(s): P Ely

Survey Unit Name: SU010 Mechanical Room Comments: Area Reclassified

#### Statistical Design Details

Area (m²):	114	Classification:	1
Selected Test:	Sign	Estimated Sigma (cpm/100 cm2):	1,000
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	15
LBGR (cpm/100 cm <sup>2</sup> ):	1,000	Estimated Conc. (cpm/100 cm²):	1,500
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.050	Post-EMC Sample Size (N):	15

#### **Prospective Power Curve**



#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDC <sup>a</sup>	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 1,000

Data/Material Mean (cpm/100 cm²)		Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm²)	
SU	1,500	1,000	3,633	

#### **Elevated Measurement Comparison (EMC) for Gross Beta**

Scanning Instrumentation Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

Background (cpm/100 cm²): 325 Total Scanning Efficiency: 0.04 True Positive Proportion: 0.85 False Positive Proportion: 0.6 Index of Sensitivity (d'): 0.82 Observation Interval (sec): 1.0 Surveyor Efficiency: 0.50 Area Factor Table Interpolation Method: Linear

<u>Statistical Design</u> <u>Hot Spot Design</u>

 N:
 15
 Actual Scan MDC\*:
 4,048

 Bounded Area (m²):
 7.6
 Area Factor:
 N/A

 Area Factor:
 Bounded Area (m²):
 N/A

 DCGLw\*:
 Post-EMC N:
 15

Scan MDC Required\*:

Contaminant	Energy <sup>a</sup>	Fract <sup>b</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>b</sup>Activity fraction

Report Created 11/11/2009 1216 (COMPASS v1.1.0)

Survey Package 010 Mechanical Room Floor Class 1 Area

> X (Max): 14.6 meters Y (Max): 9.7 meters A (Area): 142 m<sup>2</sup>

Actual Survey Area: 112.0 m<sup>2</sup>
Required Survey Points: 15 21% percent void area

N (Points): 24 19 Estimated Minimum Points

 $L = \left[\frac{A}{N}\right]^{1/2}$ 

for square grid

L= 2.4 meters (distance between measurement points)

X (Origin): 8.6 meters initially generated random number Y (Origin): 1.1 meters initially generated random number

Number of rows: 4 Number of columns: 6

Survey	Survey L	ocation.
Point	Х	Υ
Starting Point (1)	8.6	1.1
2	6.2	1.1
3	3.8	1.1
4	1.4	1.1
5	11.0	1.1
6	13.4	1.1
7	8.6	3.5
8	6.2	3.5
9	3.8	3.5
10	1.4	3.5
11	11.0	3.5
12	13.4	3.5
13	8.6	5.9
14	6.2	5.9
15	3.8	5.9
16	1.4	5.9
17	11.0	5.9
18	13.4	5.9
NA	8.6	8.3
NA	6.2	8.3
NA	3.8	8.3
19	1.4	8.3
20	11.0	8.3
21	13.4	8.3

Row

2

3

4

#### **SU011 Mezzanine Stairwell**

COMPASS Report Page 1 of 2



#### **Survey Plan Summary**

Site Name: EaglePicher Planner(s): P Ely

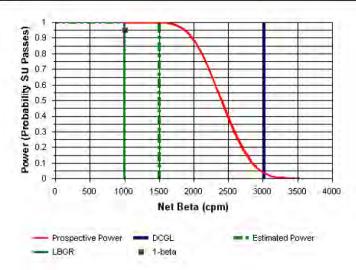
Survey Unit Name: SU011 Mezzanine Stairwell

Comments: Reclassified

#### Statistical Design Details

Area (m²):	50	Classification:	1
Selected Test:	Sign	Estimated Sigma (cpm/100 cm2):	1,000
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	15
LBGR (cpm/100 cm <sup>2</sup> ):	1,000	Estimated Conc. (cpm/100 cm²):	1,500
Alpha:	0.050	Estimated Power:	1.00
Beta:	0,050	Post-EMC Sample Size (N):	15

#### **Prospective Power Curve**



#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

L	Contaminant	HTDCa	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
	C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 1,000

Data/Material Mean (cpm/100 cm²)		Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm²)	
SU	1,500	1,000	3,633	

#### **Elevated Measurement Comparison (EMC) for Gross Beta**

Scanning Instrumentation Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

Background (cpm/100 cm²): 325 Total Scanning Efficiency: 0.04 True Positive Proportion: 0.85 False Positive Proportion: 0.6 Index of Sensitivity (d'): 0.82 Observation Interval (sec): 1.0 Surveyor Efficiency: 0.50 Area Factor Table Interpolation Method: Linear

<u>Statistical Design</u> <u>Hot Spot Design</u>

 N:
 15
 Actual Scan MDC\*:
 4,048

 Bounded Area (m²):
 3.3
 Area Factor:
 N/A

 Area Factor:
 Bounded Area (m²):
 N/A

 DCGLw\*:
 Post-EMC N:
 15

Scan MDC Required\*:

Contaminant	Energy <sup>a</sup>	Fract <sup>b</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>b</sup>Activity fraction

Report Created 10/28/2009 1437 (COMPASS v1.1.0)

Survey Package 011 Stairwell to Mezzanine Floor Class 1 Area

X (Max): 3.52 meters Y (Max): 8.51 meters A (Area): 30 m<sup>2</sup>

Actual Survey Area: 30.0 m<sup>2</sup>
Required Survey Points: 15 0% percent void area

N (Points): 20 15 Estimated Minimum Points

 $L = \left[\frac{A}{N}\right]^{1/2}$ 

for square grid

L= 1.2 meters (distance between measurement points)

X (Origin): 1.5 meters initially generated random number Y (Origin): 6.9 meters initially generated random number

Number of rows: 7 Number of columns: 3

Survey	Survey I	_ocation
Point	Х	Υ
Starting Point (1)	1.5	6.9
2	0.3	6.9
3	-0.9	6.9
4	-2.1	6.9
5	2.7	6.9
6	3.9	6.9
7	1.5	8.1
8	0.3	8.1
9	-0.9	8.1
10	-2.1	8.1
11	2.7	8.1
12	3.9	8.1
13	1.5	9.3
14	0.3	9.3
15	-0.9	9.3
16	-2.1	9.3
17	2.7	9.3
18	3.9	9.3
NA	1.5	10.5
NA	0.3	10.5
NA	-0.9	10.5
19	-2.1	10.5
20	2.7	10.5
21	3.9	10.5

Row 6

2

3

4

#### **SU012 West Hallway**

COMPASS Report Page 1 of 2



#### **Survey Plan Summary**

Site Name: EaglePicher Planner(s): P Ely

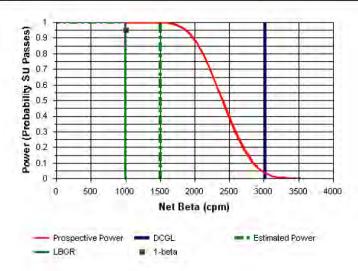
Survey Unit Name: SU012 West Hallway

Comments: Reclassified

#### Statistical Design Details

Area (m²):	50	Classification:	1
Selected Test:	Sign	Estimated Sigma (cpm/100 cm2):	1,000
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	15
LBGR (cpm/100 cm <sup>2</sup> ):	1,000	Estimated Conc. (cpm/100 cm²):	1,500
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.050	Post-EMC Sample Size (N):	15

#### **Prospective Power Curve**



#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDC <sup>a</sup>	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### **Gross Beta Mean and Sigma Data**

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 1,000

Data/Material Mean (cpm/100 cm²)		Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm²)
SU	1,500	1,000	3,633

#### **Elevated Measurement Comparison (EMC) for Gross Beta**

Scanning Instrumentation Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

Background (cpm/100 cm²): 325 Total Scanning Efficiency: 0.04 True Positive Proportion: 0.85 False Positive Proportion: 0.6 Index of Sensitivity (d'): 0.82 Observation Interval (sec): 1.0 Surveyor Efficiency: 0.50 Area Factor Table Interpolation Method: Linear

<u>Statistical Design</u> <u>Hot Spot Design</u>

 N:
 15
 Actual Scan MDC\*:
 4,048

 Bounded Area (m²):
 3.3
 Area Factor:
 N/A

 Area Factor:
 Bounded Area (m²):
 N/A

 DCGLw\*:
 Post-EMC N:
 15

Scan MDC Required\*:

Contaminant	Energy <sup>a</sup>	Fract <sup>b</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>b</sup>Activity fraction

Report Created 10/28/2009 1511 (COMPASS v1.1.0)

Survey Package 012 West Hallway Floor Class 1 Area

X (Max): 1.88 meters Y (Max): 27.00 meters A (Area): 51 m<sup>2</sup>

Actual Survey Area: 50.8 m²
Required Survey Points: 15 0% percent void area

N (Points): 27 15 Estimated Minimum Points

 $L = \left[ \frac{A}{N} \right]^{1/2}$ 

for square grid

L= 1.4 meters (distance between measurement points)

X (Origin): 0.4 meters initially generated random number Y (Origin): 10.9 meters initially generated random number

Number of rows: 19 Number of columns: 1

Survey	Survey	Location
Point	Х	Υ
Starting Point (1)	0.4	10.9
2	0.4	12.3
3	0.4	13.7
4	0.4	15.1
5	0.4	16.5
6	0.4	17.9
7	0.4	19.3
8	0.4	20.7
9	0.4	22.1
10	0.4	23.5
11	0.4	24.9
12	0.4	26.3
13	0.4	9.5
14	0.4	8.1
15	0.4	6.7
16	0.4	5.3
17	0.4	3.9
18	0.4	2.5
19	0.4	1.1

#### **SU013 Mezzanine Walls**

COMPASS Report Page 1 of 2



#### **Survey Plan Summary**

Site Name: EaglePicher Planner(s): P Ely

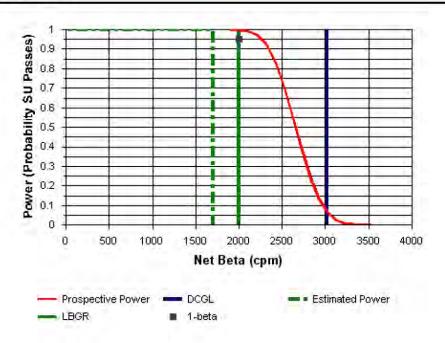
Survey Unit Name: SU013 Mezzanine Walls

Comments: N/A

#### Statistical Design Details

Area (m²):	270	Classification:	2
Selected Test:	Sign	Estimated Sigma (cpm/100 cm²):	1,005
DCGL (cpm/100 cm <sup>2</sup> ):	3,024	Sample Size (N):	28
LBGR (cpm/100 cm <sup>2</sup> ):	2,000	Estimated Conc. (cpm/100 cm²):	1,700
Alpha:	0.050	Estimated Power:	1.0
Reta:	0.050		

#### **Prospective Power Curve**



#### **Gross Beta Efficiency Data**

Instrument Description: Ludlum 43-68 with 1 Layer Mylar (0.4 mg)

 Physical Detector Area (cm²):
 126

 DCGLw (dpm/100 cm²):
 60,000

 Total Efficiency:
 0.04

 DCGLw (cpm/100 cm²):
 3,024

Contaminant	HTDCa	Energy <sup>b</sup>	Fract <sup>c</sup>	Inst. Eff.	Surf. Eff.	Total Eff.
C-14	No	49.47	1.0	0.14	0.25	0.04

<sup>&</sup>lt;sup>a</sup>Hard-to-detect contaminant <sup>b</sup>Average beta energy (keV) [N/A indicates alpha emission] <sup>c</sup>Activity fraction

#### Gross Beta Mean and Sigma Data

Count Time (min): 1
Sign Test Sigma (cpm/100 cm²): 1,005

Data/Material	Mean (cpm/100 cm²)	Std. Dev. (cpm/100 cm²)	MDC (dpm/100 cm²)
SU	2,500	1,000	4,673
Concrete Block	800	100	2,669

Report Created 10/29/2009 2203 (COMPASS v1.1.0)

Survey Package 013 Mezzanine Walls Class 2 Area

> X (Max): 88.90 meters Y (Max): 3.00 meters A (Area): 267 m<sup>2</sup>

Actual Survey Area: 266.7 m<sup>2</sup>
Required Survey Points: 28 0%

 vey Points:
 28
 0%
 percent void area

 N (Points):
 30
 28
 Estimated Minimum Points

 $L = \left[\frac{A}{N}\right]^{1/2}$ 

for square grid

L= 3.0 meters (distance between measurement points)

X (Origin): 60.2 meters initially generated random number Y (Origin): 2.7 meters initially generated random number

Number of rows: 1 3 Number of columns: 30 10

Survey	Survey l	_ocation
Point	Х	Υ
Starting Point (1)	0.2	2.7
2	3.2	0.7
3	6.2	1.7
4	9.2	2.7
5	12.2	0.7
6	15.2	1.7
7	18.2	2.7
8	21.2	0.7
9	24.2	1.7
10	27.2	2.7
11	30.2	0.7
12	33.2	1.7
13	36.2	2.7
14	39.2	0.7
15	42.2	1.7
16	45.2	2.7
17	48.2	0.7
18	51.2	1.7
19	54.2	2.7
20	57.2	0.7
21	60.2	1.7
22	63.2	2.7
23	66.2	0.7
24	69.2	1.7
25	72.2	2.7
26	75.2	0.7
27	78.2	1.7
28	81.2	2.7
29	84.2	0.7
30	87.2	1.7

Note random start location with offset survey locations have been sorted to place survey locations in an ordered sequence.

EaglePicher Survey Point Locations.xls, SU013 Mezzanine Walls

11/11/2009

#### **Attachment 7.5:** Landfill Activity Estimate

An estimate of the activity sent to the landfill from the EaglePicher decommissioning in Lenexa Kansas was generated based on average activities on building surfaces and building surface areas of materials sent to the landfill. The activities were average activities measured during the Final Status Survey as indicated in Table 4-1 of this report. In order to accurately estimate activities, removable activity measurements were utilized including the factor of 10 increase based on a 10% smear activity removal efficiency. The direct C-14 measurements were not used because they would have resulted in an overestimation of the C-14 activity as material specific backgrounds were not subtracted from each measurement. In addition there was no equivalent H-3 measurement data as H-3 can not be directly measured with portable survey instrumentation.

The table below provides a listing of sizes for the various walls and floors, the associated activity levels, the waste weight, and the total and average activities for H-3 and C-14 in the waste sent to the landfill.

### **Landfill Activity Estimate**

						CD L	andfill
	Area	C-14 Activity*	C-14 Activity	H-3 Activity*	H-3 Activity	Volume	Weight
Building Area	(ft <sup>2</sup> )	(dpm/100 cm <sup>2</sup> )	(pCi)	(dpm/100 cm <sup>2</sup> )	(pCi)	(ft <sup>3</sup> )	(lbs)
East Outside Wall	2,295	1.78E+01	1.71E+05	6.77E+01	6.50E+05	2,295	275,400
East Office Area East Wall	800	5.62E+01	1.88E+05	3.07E+01	1.03E+05	400	6,000
East Office Area West Wall	800	5.62E+01	1.88E+05	3.07E+01	1.03E+05	400	6,000
East Office Area Account. Wall	250	5.62E+01	5.88E+04	3.07E+01	3.21E+04	125	1,875
East Office Area East Library Wall	1,250	5.62E+01	2.94E+05	3.07E+01	1.60E+05	625	9,375
East Office Area West Library Wall	1,250	5.62E+01	2.94E+05	3.07E+01	1.60E+05	625	9,375
East Office Area Stockroom West Wall	420	5.62E+01	9.87E+04	3.07E+01	5.39E+04	210	3,150
East Office Area Office Wall	90	5.62E+01	2.12E+04	3.07E+01	1.15E+04	45	675
East Office Area Restroom West Wall	420	5.62E+01	9.87E+04	3.07E+01	5.39E+04	210	3,150
East Office Area Solvent Storage Hallway East Wall	350	5.62E+01	8.23E+04	3.07E+01	4.49E+04	175	2,625
East Office Area Solvent Storage Hallway West Wall	420	5.62E+01	9.87E+04	3.07E+01	5.39E+04	210	3,150
East Office Area NMR Lab East Wall	200	5.62E+01	4.70E+04	3.07E+01	2.57E+04	100	1,500
West Outside Wall	3,380	1.78E+01	2.52E+05	6.77E+01	9.57E+05	3,380	405,600
North Outside Wall	2,210	1.78E+01	1.65E+05	6.77E+01	6.26E+05	2,210	265,200
North Outside Wall	1,292	1.78E+01	9.62E+04	6.77E+01	3.66E+05	1,292	155,040
East Office Area South Office Wall	200	5.62E+01	4.70E+04	3.07E+01	2.57E+04	100	1,500
East Office Area South Office Wall	200	5.62E+01	4.70E+04	3.07E+01	2.57E+04	100	1,500
East Office Area South Hallway North Wall	520	5.62E+01	1.22E+05	3.07E+01	6.67E+04	260	3,900
East Office Area Accounting North Wall	200	5.62E+01	4.70E+04	3.07E+01	2.57E+04	100	1,500
East Office Area Center Hallway South Wall	520	5.62E+01	1.22E+05	3.07E+01	6.67E+04	260	3,900
East Office Area Center Hallway North Wall	940	5.62E+01	2.21E+05	3.07E+01	1.21E+05	470	7,050
East Office Area Main Entrance North Wall	940	5.62E+01	2.21E+05	3.07E+01	1.21E+05	470	7,050
East Office Area Lunch Room South Wall	920	5.62E+01	2.16E+05	3.07E+01	1.18E+05	460	6,900
East Office Area Lunch Room North Wall	920	5.62E+01	2.16E+05	3.07E+01	1.18E+05	460	6,900
South Outside Wall	3,485	1.78E+01	2.59E+05	6.77E+01	9.87E+05	3,485	418,200
Mechanical Room North Wall	460	5.62E+01	1.08E+05	3.07E+01	5.90E+04	460	55,200
Slab	15,720	4.65E+02	3.06E+07	5.14E+02	3.38E+07	7,860	943,200
Remaining Slab	2,700	4.65E+02	5.25E+06	5.14E+02	5.81E+06	1,350	162,000
Column Pads	136	5.62E+01	3.20E+04	3.07E+01	1.74E+04	204	24,480
Roof	15,720	4.31E+01	2.84E+06	9.17E+01	6.04E+06	7,860	943,200
Roof	9,825	2.72E+01	1.12E+06	3.05E+01	1.25E+06	4,913	589,500
Footers	2,204	5.62E+01	5.18E+05	3.07E+01	2.83E+05	3,306	396,720
Machine Rm HVAC	544	5.62E+01	1.28E+05	3.07E+01	6.98E+04	960	38,400
Compressor	33	5.62E+01	7.75E+03	3.07E+01	4.23E+03	18	1,080
Boiler	42	5.62E+01	9.97E+03	3.07E+01	5.44E+03	45	5,400
Total (pCi):			4.43E+07		5.25E+07	45,443	4,765,695
Average Concentration in Landfill Waste (pCi/g):			2.05E-02		2.43E-02	-, -	,,.,.

<sup>\*</sup> These activities were based on removable activity measurements assuming a smear removal efficiency of 10%.

**Attachment 7.6:** Laboratory Analytical Reports

Analytical Report	Attachment Pages	Samples
Test America 220-10654-1	1 to 64	ES-SU009-S-01
		ES-SU009-S-02
		ES-SU009-S-03
		ES-SU009-S-04
		ES-SU009-S-05
		ES-SU009-S-11
		ES-SU009-S-12
		ES-SU009-S-17
		ES-SU009-S-19
		ES-SU009-S-20
		ES-SU009-S-26
		ES-SU009-S-30
		ES-SU009-S-32
		ES-SU009-S-36
		ES-SU009-S-36A
Test America 220-10920	65 to 92	ES-SU009-S-6
		ES-SU009-S-7
		ES-SU009-S-8
		ES-SU009-S-9
		ES-SU009-S-10
		ES-SU009-S-13
		ES-SU009-S-16
		ES-SU009-S-23
		ES-SU009-S-24
		ES-SU009-S-25
		ES-SU009-S-27
		ES-SU009-S-28
		ES-SU009-S-29
		ES-SU009-S-31
		ES-SU009-S-34
		ES-SU009-S-35
		ES-B-S-10
Eberline WO#09-11114-OR	93 to 176	ES-SU009-S-15
		ES-SU009-S-18
		ES-SU009-S-21
		ES-B-S-1
		ES-B-S-2
		ES-B-S-3
		ES-B-S-4
		ES-B-S-5
		ES-B-S-6
		ES-B-S-7
		ES-B-S-8
		ES-B-S-9



#### **ANALYTICAL REPORT**

Job Number: 220-10654-1

SDG Number: 220-10654

Job Description: Lenexa, KS

For:

Energy Solutions, LLC 1009 Commerce Park Drive Suite 100 Oak Ridge, TN 37830

Attention: Mr. John Davis

Approved for release Erin A Arasate Project Manager I 12/8/2009 10:26 AM

Erin A Arasate
Project Manager I
erin.arasate@testamericainc.com
12/08/2009
Revision: 1

The test results in this report meet all NELAP requirements unless specified within the case narrative. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Project Manager.

TestAmerica Connecticut Certifications and Approvals: CTDOH PH-047, MADEP CT023, RIDOH A43, NYDOH 10602, NY NELAP 10602, NHDES 2528, NJDEP CT410, ME DOH CT023, UT DOH 2032614458



#### Job Narrative 220-10654-1

#### Comments

No additional comments.

**Receipt**No analytical or quality issues were noted.

#### **METHOD SUMMARY**

Client: Energy Solutions, LLC

Job Number: 220-10654-1 Sdg Number: 220-10654

 Description
 Lab Location
 Method
 Preparation Method

 Matrix
 Solid

 Tritium
 TAL SL
 RAD EPA EPA

Lab References:

TAL SL = TestAmerica St. Louis

**Method References:** 

RAD EPA = EPA Radioanalytical Methodology

#### **SAMPLE SUMMARY**

Client: Energy Solutions, LLC Job Number: 220-10654-1

Sdg Number: 220-10654

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
220-10654-1	ES-SU009-S-01	Solid	11/06/2009 0900	11/09/2009 0856
220-10654-2	ES-SU009-S-02	Solid	11/06/2009 0910	11/09/2009 0856
220-10654-3	ES-SU009-S-03	Solid	11/06/2009 0920	11/09/2009 0856
220-10654-4	ES-SU009-S-04	Solid	11/06/2009 0930	11/09/2009 0856
220-10654-5	ES-SU009-S-05	Solid	11/06/2009 0940	11/09/2009 0856
220-10654-6	ES-SU009-S-11	Solid	11/06/2009 0955	11/09/2009 0856
220-10654-7	ES-SU009-S-12	Solid	11/06/2009 1005	11/09/2009 0856
220-10654-8	ES-SU009-S-17	Solid	11/06/2009 1015	11/09/2009 0856
220-10654-9	ES-SU009-S-19	Solid	11/06/2009 1025	11/09/2009 0856
220-10654-10	ES-SU009-S-20	Solid	11/06/2009 1035	11/09/2009 0856
220-10654-11	ES-SU009-S-26	Solid	11/06/2009 1045	11/09/2009 0856
220-10654-12	ES-SU009-S-30	Solid	11/06/2009 1055	11/09/2009 0856
220-10654-13	ES-SU009-S-32	Solid	11/06/2009 1125	11/09/2009 0856
220-10654-14	ES-SU009-S-36	Solid	11/06/2009 1110	11/09/2009 0856
220-10654-15	ES-SU009-S-36 A	Solid	11/06/2009 1110	11/09/2009 0856

## **SAMPLE RESULTS**

## **QUALITY CONTROL RESULTS**

# SUBCONTRACTED DATA



TestAmerica Laboratories, Inc.

#### ANALYTICAL REPORT

PROJECT NO. 220-10654

Lenexa, KS

Lot #: F9K110458

TestAmerica Connecticut

TestAmerica Connecticut 128 Long Hill Cross Road Shelton, CT 06484

TESTAMERICA LABORATORIES, INC.

Ray (Clay Project Manager

November 25, 2009

Page 8 of 64 8 of 176

## Case Narrative LOT NUMBER: F9K110458

This report contains the analytical results for the 15 samples received under chain of custody by TestAmerica St. Louis on November 11, 2009. These samples are associated with your Lenexa, KS project.

The analytical results included in this report meet all applicable quality control procedure requirements.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. **TestAmerica St. Louis' Florida certification number is E87689.** The case narrative is an integral part of this report.

This report shall not be reproduced, except in full, without the written approval of the laboratory.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

#### **Observations/Nonconformances**

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

There are no observations or nonconformances associated with the analysis in this lot.

#### **METHODS SUMMARY**

#### F9K110458

PARAMETER

ANALYTICAL PREPARATION METHOD

METHOD

Percent Moisture

MCAWW 160.3 MOD MCAWW 160.3 MOD Tritium by LSC

EML H3-04-RC MO

#### References:

EML

"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

MCAWW

"Methods for Chemical Analysis of Water and Wastes",  ${\rm EPA-600/4-79-020}$ , March 1983 and subsequent revisions.

#### SAMPLE SUMMARY

#### F9K110458

<u>WO #</u>	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LN8LX	001	ES-SU009-S-01	11/06/09	09:00
LN8L4	002	ES-SU009-S-02	11/06/09	09:10
LN8L5	003	ES-SU009-S-03	11/06/09	09:20
LN8L6	004	ES-SU009-S-04	11/06/09	09:30
LN8L7	005	ES-SU009-S-05	11/06/09	09:40
LN8L8	006	ES-SU009-S-11	11/06/09	09:55
LN8L9	007	ES-SU009-S-12	11/06/09	10:05
LN8MA	800	ES-SU009-S-17	11/06/09	10:15
LN8MD	009	ES-SU009-S-19	11/06/09	10:25
LN8ME	010	ES-SU009-S-20	11/06/09	10:35
LN8MF	011	ES-SU009-S-26	11/06/09	10:45
LN8MH	012	ES-SU009-S-30	11/06/09	10:55
LN8MJ	013	ES-SU009-S-32	11/06/09	11:25
LN8MM	014	ES-SU009-S-36	11/06/09	11:10
LN8MN	015	ES-SU009-S-36 A	11/06/09	11:10

#### NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

## TestAmerica Connecticut Client Sample ID: ES-SU009-S-01

#### Radiochemistry

Lab Sample ID: F9K110458-001

Work Order:

Matrix:

LN8LX SOLID

Date Collected: Date Received:

11/06/09 0900

11/11/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	pq	i/g	Batch :	<b># 9316165</b>	Yld %
Tritium	0.23	U	0.17	2.00	0.24	11/12/09	11/13/09

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

Result is less than the sample detection limit.

#### TestAmerica Connecticut

#### Client Sample ID: ES-SU009-S-02

#### Radiochemistry

Lab Sample ID: F9K110458-002

Work Order:

Matrix:

LN8L4 SOLID Date Collected:

11/06/09 0910

Date Received:

11/11/09 0910

Total	

			Total Uncert.			Prep	Analysis
Parameter	Result	Qual	(2 g+/-)	RL	mdc	Date	Date
Tritium by LSC	by DOE H3-04-RC	MOD.	pq	Ci/g	Batch :	<b># 9316165</b>	Yld %
Tritium	-0.03	ซ	0.12	2.00	0.24	11/12/09	11/13/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

Result is less than the sample detection limit.

## Radiochemistry

Lab Sample ID: F9K110458-003

Work Order: LN8L5

Matrix:

SOLID

Date Collected:

11/06/09 0920

Date Received:

11/11/09 0910

Total

			Uncert.			Prep	Analysis
Parameter	Result	Qual	(2 σ+/-)	RL	mdc	Date	Date
Tritium by LSC by DOE H3-04-RC MOD.		ρg	i/g	Batch # 9316165		Yld %	
Tritium	0.03	Ū	0.14	2.00	0.26	11/12/09	11/13/09
		-				,,	

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K110458-004

Result

0.11

Work Order:

Matrix:

Parameter

Tritium

LN8L6

SOLID

Tritium by LSC by DOE H3-04-RC MOD.

Date Collected:

11/06/09

0930

11/12/09

11/13/09

Date Received:

2.00

11/11/09

0910

Total

0.15

Oual

U

Uncert. Prep Analysis Date Date  $(2 \sigma + / -)$ RLmđc pCi/g Batch # 9316165 Yld %

0.24

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K110458-005

Work Order:

Matrix:

LN8L7 SOLID Date Collected:

11/06/09 0940

Date Received:

11/11/09 0910

Total

			Uncert.			Prep	Analysis	
Parameter	Result	Qual	(2 g+/-)	RL	mdc	Date	Date	
Tritium by LSC	by DOE H3-04-RC	MOD.	pq	Ci/g	Batch #	9316165	Yld %	
Tritium	0.15	ΰ	0.15	2.00	0.25	11/12/09	11/13/09	

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-11

## Radiochemistry

Lab Sample ID: F9K110458-006

Work Order:

Matrix:

LN8L8 SOLID Date Collected:

11/06/09

0955

Date Received:

11/11/09

0910

Total

Uncert.

Analysis

Parameter	Result	Qual	(2 g+/-)	RL	mdc	Date	Date	
Tritium by LSC	by DOE H3-04-RC	MOD.	p0	Ci/g	Batch #	9316165	Yld %	
Tritium	-0.09	υ	0.11	2.00	0.24	11/12/09	11/13/09	

#### NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K110458-007

Work Order:

Matrix:

LN8L9 SOLID Date Collected:

11/06/09 1005

Date Received:

11/11/09 0910

			Uncert.			Prep	Analysis	
Parameter	Result	Qual	(2 g+/-)	RL	mdc	Date	Date	
Tritium by LSC	by DOE H3-04-RC	MOD.	pq	Ci/g	Batch #	<b>9316165</b>	Yld %	
Tritium	-0.11	Ŭ	0.11	2.00	0.25	11/12/09	11/13/09	

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-17

## Radiochemistry

Lab Sample ID: F9K110458-008

Work Order:

Matrix:

LN8MA SOLID

Date Collected:

11/06/09 1015

Date Received:

11/11/09 0910

Total

			Uncert.		Prep	Analysis	
Parameter	Result	Qua1	(2 g+/-)	RL	mdc	Date	Date
Tritium by LSC by DOE H3-04-RC MOD.		pCi/g		Batch :	<b># 9316165</b>	Yld %	
Tritium by LSC	DY DOE H3-04-KC	MOD.	<b></b>	-, 9			

#### NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-19

## Radiochemistry

Lab Sample ID: F9K110458-009

Work Order:

Matrix:

LN8MD SOLID

Date Collected:

11/06/09 1025

Date Received:

11/11/09 0910

Total

			Uncert.			Prep	Analysis
Parameter	Result	Qual	(2 σ+/-)	RL	mdc	Date	Date
Tritium by LSC by DOE H3-04-RC MOD.		pCi/g		Batch i	<b># 9316165</b>	Yld %	
Tritium	-0.05		0.12	2.00	0.25	11/12/09	11/14/09

### NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K110458-010

Work Order:

Matrix:

SOLID

LN8ME

Date Collected:

11/06/09 1035

Date Received:

11/11/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LS	by DOE H3-04-RC	MOD.	pq	:i/g	Batch #	9316165	Yld %
	0.17		0.16	2.00	0.25	11/12/09	11/14/09

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-26

# Radiochemistry

Lab Sample ID: F9K110458-011

Work Order:

Matrix:

LN8MF SOLID Date Collected:

11/06/09 1045

Date Received:

11/11/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date	
Tritium by LSC	by DOE H3-04-RC	MOD.	pq	Ci/g	Batch #	9316165	Yld %	
Tritium	0.03	ŭ	0.13	2.00	0.24	11/12/09	11/14/09	

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Client Sample ID: ES-SU009-S-30

# Radiochemistry

Lab Sample ID: F9K110458-012

Work Order:

Matrix:

LN8MH SOLID Date Collected:

11/06/09 1055

Date Received:

11/11/09 0910

Parameter	<b>Result</b>	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LS	C by DOE H3-04-R0	C MOD.	ρg	:i/g	Batch	# 9316165	Yld %
Tritium	0.12	U	0.15	2.00	0.25	11/12/09	11/14/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K110458-013

Work Order:

Matrix:

LN8MJ SOLID Date Collected:

11/06/09 1125

Date Received:

11/11/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	DQ.	:i/g	Batch #	9316165	Yld %
Tritium	-0.10	U	0.11	2.00	0.25	11/12/09	11/14/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K110458-014

Work Order:

Matrix:

LN8MM SOLID

Date Collected:

11/06/09 1110

Date Received:

11/11/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC by DOE H3-04-RC MOD.		pCi/g		Batch # 9316165		Yld %	
Tritium	0.007	υ	0.13	2.00	0.24	11/12/09	11/14/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Radiochemistry

Matrix:

Lab Sample ID: F9K110458-015

Work Order:

LN8MN SOLID Date Collected:

11/06/09

1110

Date Received:

11/11/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	pq	i/g	Batch :	# 9316165	Yld %
Tritium	-0.03	Ü	0.12	2.00	0.25	11/12/09	11/14/09

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## METHOD BLANK REPORT

## Radiochemistry

Client Lot ID:

F9K110458

Matrix:

SOLID

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	MDC	Pre Dat	
Tritium by La	SC by DOE H3-04-1	RC MOD.	pCi/g	Batch #	9316165	Yld %	F9K120000-165B
Tritium	-0.04	U	0.11	2.00	0.22	11,	12/09 11/13/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only Bold results are greater than the MDC.

# Laboratory Control Sample Report

## Radiochemistry

Client Lot ID:

F9K110458

Matrix:

SOLID

			Total		Lab	Sample ID
Parameter	Spike Amount	Result	Uncert. (2 σ+/-)	MDC	% Yld % Rec	QC Control Limits
Tritium by LSC	by DOE H3-04-RC M	OD.	pCi/g	H3-04-RC MOD	F9K1	120000-165C
Tritium	15.3	15.2	1.2	0.2	99	(75 ~ 104)
	Batch #:	9316165		Analysis Dat	e: 11/13/09	

## DUPLICATE EVALUATION REPORT

# Radiochemistry

Client Lot ID:

F9K110458

Matrix:

SOLID

Date Sampled: 11/06/09

Date Received: 11/11/09

		Total			Total	(	QC Sample ID	
Parameter	SAMPLE Result	Uncert. (2 c +/-)	% Yld	DUPLICATE Result	Uncert. (2 g+/-)	% Yld	Precisio	on
Tritium by LSC	by DOE H3-04-RC	MOD.	pCi/g	H3-04-RC	MOD	F9	K110458-00	1
Tritium	0.23	U 0.17		-0.03 U	0.12		253	%RPD
	Batch	<b>#:</b> 9316165	(Sample)	9316165 (	Duplicate)			

NOTE(S)

Data are incomplete without the case narrative. Calculations are performed before rounding to avoid round-off error in calculated results

## MATRIX SPIKE REPORT

## Radiochemistry

Client Lot Id:

F9K110458

Matrix:

SOLID

Date Sampled:

11/06/09

Date Received:

11/11/09

			Maka 1			Tota1		QC Sample	∍ ID
Parameter	Spike Amount	<i>S</i> pike Result	Total Uncert. (2 <sub>0</sub> +/-)	Spike Yld.	Sample Result	Uncert. (2 g +/-)	%YLD	'%REC	QC Control Limits
Tritium by LSC by DO	E H3-04-RC M	DD.	pCi/g	нз	-04-RC	MOD	F	9K110458	3-002
Tritium	15.3	15.0	1.2		-0.03	0.12		98	(62 - 129)
	Batch #:	9316165	An	alysis I	ate:	11/13/09			

NOTE(S)

Data are incomplete without the case narrative.

Calculations are performed before rounding to avoid round-off errors in calculated results.

ne (203) 929-8140 Fax (203) 929-8142  ent Information (Sub Contract Lab)  i Contact:  sping/Receiving pany: tAmerica Laboratories, Inc. ess: 15 Rider Trail North.	Sampler:			Lab PM:				Carrier Tracking No(s)	4:	COC No:	
formation (Sub Contract Lab)  teceiving ca Laboratories, Inc.						i l	Ŝ		÷o		
i Contact sping/Receiving pany: tAmerica Laboratories, Inc. ess: 15 Rider Trail North,				Arasate	Arasate, Erin A					220-4471.1	
pany: tAmerica Laboratories, Inc. ess: 15 Rider Trail North,	Phone:			E-Mail: erin.ara	E-Mail: erin.arasate@testamericainc.com	enicainc.com				Page:	
ess: 15 Rider Trail North, , In City				,		Analysis		Requested		Job #: 220-10654-1	
th City	Due Date Requested: 11/25/2009	÷,							1125	Preservation Codes	les: M - Hexane
6	TAT Requested (da	ys):								B - NaOH C - Zn Acetate	N - None O - AsNaO2
3, Zip:					olica de				is not	D - Nitric Acid E - NaHSO4	P - Na2045 Q - Na2SO3
, 530453 HE: - 208. RESERTED 314.208.8757/Fax)	₩О#:									F - MeOH G - Amchlor H - Ascorbic Acid	R - Na2S2SO3 S - H2SO4 T - TSP Dodecahydrate
I.	₩O#;				. (0)						U - Acetone V - MCAA
ect Name.	Project #: 22002640		-		10.90					K.EDTA L-EDA	W - ph 4-5 Z - other (specify)
ביים ביים ביים ביים ביים ביים ביים ביים	SSOW#:			OMES	w ds					Other:	
		-	Sample Type	Matrix (*******	MSM IIII SARTNOS				ecuniti		
ர p nple identification - Client ID	Sample Date	<b>a</b>	(C=comp, G=grab)		ens 494						Special Instructions/Note:
		X	Preservation Code.	× ⊒eoou	X					\$81.0	
31 ES-SU009-S-01	11/6/09	9:00		Solid	×					6	80 P
O ES-SU009-S-02	11/6/09	9:10		Solid	×				i ja alli		Each
ES-SU009-S-03	11/6/09	9:20		Solid	×					E-for-Alle	
4 ES-SU009-S-04	11/6/09	9:30		Solid	×				env i v	Ruse Z	
ES-SU009-S-05	11/6/09	9:40		Solid	×						
ES-SU009-S-11	11/6/09	9:55		Solid	×				II law		
ES-SU009-S-12	11/6/09	10:05		Solid	×					BRANK I	
ES-SU009-S-17	11/6/09	10:15		Solid	×				POPEN.		
ES-SU009-S-19	11/6/09	10:25		Solid	×						
ES-SU009-S-20	11/6/09	10:35	<del>. v.</del>	Solid	×				- PE	g u	
ES-SU009-S-26	11/6/09	10:45	1.1	Solid	×					Press.	
lant [	Poison B Unkı	Unknown 🗀 f	Radiological		Sample Di:	le Disposal ( A fee Return To Client	e may be as:	assessed if sam Disposal By Lab	ples are retai	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client Disposal By Lab Archive For Mon	1 month) Months
liverable Requested: I, II, III, IV, Other (specify)					Special Inst	Special Instructions/QC Requirements:	Requirements				
npty Kit Relinquished by:		Date:			Time:			Method of Shipment:	ipment:		
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8 Inquished by:	Cate Inne.			Company	100000	١			1 1		,
	Date/Time:			Company	Received by:	f by:			Date/Time:		Company
O Sustody Seals Intact: Custody Seal No.:					Cooler T	Coolar Temperature(s) °C and Other Remarks:	; and Other Rem	ıarks:			

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D Long Hill Cross Road A Iton, CT 06484 - L			5		onsno	יא אפרי	<u>5</u>				14E 1 BASER II	HE LEAGER IN CHARGOLATURAL TESTING	STENG
	Sampler:		Ē.	Lab PM: Arasate,	Erin A			Carrier Tracking No(s)	ing No(s):		COC No: 220-4471.2		
it Contact:	Phone:			E-Mall: erin.arasate@te	E-Mail: erin.arasate@testamericainc.com	ericainc.com	-				Page: Page 2 of 2		
						Ana	Analysis Requested	pested			Job #: 220-10654-1		
The second accordance of the Control	Due Date Requested: 11/25/2009	Ü									Preservation Codes	Codes: M - Hexane	
	TAT Requested (days):	ys):			ı						B - NaOH C - Zn Acetate	N - None O - AsNaO2 P - NaOO4S	
a. Zip. 63045	1	r			multh					1	E - NaHSO4 F - MeOH	Q - Na2SSO3 R - Na2SSSO3	
ne: I-298-8566(Tel) 314-298-8757(Fax)	PO#:			Ö	T · O.					944446 944446			drate
	:# OM			)303 <b>5</b>	f					SUE	1 - Ice J - DI Water K - FOTA	V - MCAA W - oh 4-5	
ect Name: nexa, KS	Project #: 22002640			9X) #1	www.a/(2020)		<b>Matter</b>			វាធាក		Z - other (specify)	
	SSOW#:			dines	Ani A deli votto					20 10 .	Other:		
		Sample	Sample Type (C=comp,	Matrix (www.ese.	M.ZM most					edmuNiss,			
Windle Identification - Cilent ID	Sample Date	7600	3=grab) Preserva	2	100 mm 2						3118	Special Instructions/Note:	
32		10:55		Solid	×								
ES-SU009-5-32	11/6/09	11:25		Solid	×					energy ratings			
	11/6/09	11:10		Solid	×								
4 ye-s-6000s-s3	11/6/09	11:10		Solid	×								
					·								
		_											
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ant	Poison B 🔲 Unki	Unknown 🗀 r	Radiological		Sample DI	le Disposal ( A fi Retum To Client	ee may be	assessed if sam Disposal By Lab	if samples y Lab	are retain	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client Disposal By Lab Mon	an 1 month) Months	
⊮iverable Requested: I, II, III, IV, Other (specify)					Special ins	Special instructions/QC Requirements.	кефигетт						
npty Kit Relinquished by:		Date:			Time:			Metho	Method of Shipment	١			
iludnished by	Date/Time:	) t	471	Company	Received by:	Jan Kar		M	Date/Time	0	9 09	Company C	1
8 ilinquished by:				Сотрапу	Rectified by.	lby: [/			Date/yme:	ле: /	•	Company	
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O 6 Custody Seals Inted: Custody Seal No.:			la i e		Cooler T	Cooler Temperature(s) °C and Other Remarks:	Can'd Other F	'emarks:					
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TestAme	erica Lot#	<sup>(s):</sup> _	F9K1104	50	
THE LEADER IN ENVIRONME	ENTAL TESTING	_			•
CONDITION U	JPON RECEIPT FORM	-			
Client:	TA Conn	,			
Quote No:	<b>&amp;UU18</b>		38		
COC/RFA No:	220-47711/220-4471.	l,		1	
Initiated By:	ck'	Da		1/09	Time:
			ormation /	,	
Shipper: Fe	edEx UPS DHL Courier Clien	it Ot	her:		ultiple Packages: Y N  perature (s):**
	7055 0386 6	٠		-	Glent 6.
	7				7.
	8.				
*	9.				
	10.				10.
	correspond to Numbered Sample Temp lines	**Sam	iple must be received	d at 4°C ± 2°C- If no the following: Meta	ot, note contents below. Temperature als-Liquid or Rad tests-Liquid or Solids
Condition (Circle "Y"	for yes, "N" for no and "N/A" for not applicable):	141141			
1. (Y) N	Are there custody seals present on the cooler?	8.	Y(N)	Are there cust	ody seals present on bottles?
2. Y (N) N/A	Do custody seals on cooler appear to be tampered with?	9.	Y N (N/A)		als on bottles appear to be?
3. (Ŷ)N	Were contents of cooler frisked after	10.	Y N N/A		eceived with proper pH1? (If not,
4. (Ŷ) N	opening, but before unpacking?  Sample received with Chain of	11.	√ N		ed in proper containers?
5, (Ŷ) N N/A	Custody?  Does the Chain of Custody match sample ID's on the container(s)?	12.	Y N (N/A)	Headspace in (If Yes, note sam	VOA or TOX liquid samples?
(6. (Y) N	Was sample received broken?	13.	Y N N/A		COC/Workshare received?
7. (Y) N	Is sample volume sufficient for analysis?	14.	Y N MA	Was pH taken	by original TestAmerica lab?
•	ANL, Sandia) sites, pH of ALL containers received m	ust be v	erified, EXCEPT V	OA, TOX and soils.	
Notes:	V r ( c 000	····	( ~ >		
	* ES-5000°	1	<u> </u>		
	received be	2/5.0	7		
	100 h 300	مين _			
		<u>.</u>			
	***************************************				
Corrective Action:  Client Contact N	Jame.		Informed by:		•
☐ Sample(s) proce	ssed "as is"				
☐ Sample(s) on ho Project Management		II rele	eased, notify: Date:		11-16-09
THIS FORM MUST BE	COMPLETED AT THE TIME THE ITEMS ARE BE I THAT PERSON IS REQUIRED TO APPLY THEIR	RINITL	AL AND THE DATI	E NEXT TO THAT	LETED BY SOMEONE OTHER THAN ITEM. ASST-LOUIS/ADMIN/Admin/004 rev1 l.doc

Page 33 of 64 33 of 176



TestAmerica Laboratories, Inc.

# ANALYTICAL REPORT

Lenexa, KS

Lot #: F9K300455

TestAmerica Connecticut

TestAmerica Connecticut 128 Long Hill Cross Road Shelton, CT 06484

TESTAMERICA LABORATORIES, INC.

Project Manager

December 7, 2009

Page 34 of 64 34 of 176

### Case Narrative LOT NUMBER: F9K300455

This report contains the analytical results for the 15 samples received under chain of custody by TestAmerica St. Louis on November 30, 2009. These samples are associated with your Lenexa, KS project.

The analytical results included in this report meet all applicable quality control procedure requirements.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. **TestAmerica St. Louis' Florida certification number is E87689.** The case narrative is an integral part of this report.

This report shall not be reproduced, except in full, without the written approval of the laboratory.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

# Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

There are no observations or nonconformances associated with the analysis in this lot.

# **METHODS SUMMARY**

## F9K300455

PARAMETER

ANALYTICAL METHOD

PREPARATION METHOD

Carbon 14 by LSC

EERF C-01-1

References:

EERF

EERF

# SAMPLE SUMMARY

#### F9K300455

WO # SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LP9AG 001 LP9AH 002 LP9AJ 003 LP9AK 004 LP9AL 005 LP9AM 006 LP9AN 007 LP9AP 008 LP9AQ 009 LP9AR 010 LP9AT 011 LP9AV 012 LP9AX 013 LP9AO 014 LP9AO 015	ES-SU009-S-01 ES-SU009-S-02 ES-SU009-S-03 ES-SU009-S-04 ES-SU009-S-05 ES-SU009-S-11 ES-SU009-S-12 ES-SU009-S-17 ES-SU009-S-19 ES-SU009-S-20 ES-SU009-S-26 ES-SU009-S-30 ES-SU009-S-36 ES-SU009-S-36	11/06/09 11/06/09 11/06/09 11/06/09 11/06/09 11/06/09 11/06/09 11/06/09 11/06/09 11/06/09 11/06/09	09:10 09:20 09:30 09:40 09:55 10:05 10:25 10:35 10:45 10:55 11:25 11:10

# NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

# Radiochemistry

Lab Sample ID: F9K300455-001

Work Order: Matrix:

LP9AG SOLID

Date Collected:

11/06/09

0900

Date Received:

11/30/09

1600

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by E	ERF C-01-1			pCi/g	Batch	# 9336123	Yld %
Carbon 14	0.77	υ	0.65	5.00	1.0	12/02/09	12/03/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-02

## Radiochemistry

Lab Sample ID: F9K300455-002

Work Order: Matrix:

LP9AH SOLID

Date Collected:

11/06/09 0910

Date Received:

11/30/09

1600

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by E	ERF C-01-1		I	Ci/g	Batch	# 9336123	Yld %
Carbon 14	3.36	J	0.85	5.00	1.0	12/02/09	12/03/09

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Radiochemistry

Lab Sample ID: F9K300455-003

Work Order: Matrix:

LP9AJ SOLID Date Collected:

11/06/09 0920

Date Received:

11/30/09 1600

Tota1

Parameter	Result	Qual	Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by EE	RF C-01-1		p	Ci/g	Batch #	9336123	Yld %
Carbon 14	1.70	J	0.72	5.00	1.0	12/02/09	12/03/09

### NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Radiochemistry

Lab Sample ID: F9K300455-004

Work Order: Matrix:

LP9AK SOLID Date Collected:

11/06/09 0930

Date Received:

11/30/09 1600

			Uncert.			Prep ,	Analysis	
Parameter	Result	Qual	(2 σ+/-)	RL	mdc	Date	Date	
Carbon 14 by EERF C-01-1		pCi/g		Ci/q	Batch # 9336123		Yld %	
Carbon 14	1.18	J	0.69	5.00	1.0	12/02/09	12/03/09	

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K300455-005

Work Order: Matrix:

LP9AL SOLID Date Collected:

11/06/09 0940

Date Received:

11/30/09 1600

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by EERF C-01-1			р	Ci/g	Batch	# 9336123	Yld %
Carbon 14	2.20	J	0.75	5.00	1.0	12/02/09	12/03/09

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Radiochemistry

Lab Sample ID: F9K300455-006

Work Order: Matrix:

LP9AM SOLID

Date Collected:

11/06/09 0955

Date Received:

11/30/09 1600

			Uncert.			Prep	Analysis	
Parameter	Result	Qual	(2 g+/-)	RL	mđc	Date	Date	J.
Carbon 14 by E	ERF C-01-1		I	Ci/g	Batch #	9336123	Yld %	
Carbon 14	2.79	J	0.81	5.00	1.0	12/02/09	12/03/09	

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-12

# Radiochemistry

Lab Sample ID: F9K300455-007

Work Order:

Matrix:

LP9AN SOLID

Date Collected:

11/06/09 1005

Date Received:

11/30/09 1600

			Uncert.			Prep	Analysis	
Parameter	Result	Qual	(2 g+/-)	RL	mdc	Date	Date	
Carbon 14 by EF	ERF C-01-1		pq	Ci/g	Batch #	9336123	Yld %	
Carbon 14	1.52	J	0.71	5.00	1.0	12/02/09	12/03/09	

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Radiochemistry

Lab Sample ID: F9K300455-008

Work Order: Matrix:

LP9AP SOLID Date Collected:

11/06/09 1015

Date Received:

11/30/09 1600

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by EERF C-01-1			1	pCi/g	Batch	# 9336123	Yld %
Carbon 14	4.87	J	0.97	5.00	1.0	12/02/09	12/03/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Radiochemistry

Lab Sample ID: F9K300455-009

Work Order:

Matrix:

LP9AO SOLID Date Collected:

11/06/09 1025

Date Received:

11/30/09 1600

Qual	(2 g+/-)	RL	mdc	Prep Date	Analysis
				_	Date
	q	Ci/g	Batch #	9336123	771 2 0.
J	0.79	<del>-</del>			Yld % 12/03/09
	J	J 0.79	J 0.79 5.00	J 0.79 5.00 1.0	J 0.79 5.00 1.0 12/02/09

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-20

## Radiochemistry

Lab Sample ID: F9K300455-010

Work Order:

Matrix:

LP9AR SOLID

Date Collected:

11/06/09

1035

Date Received:

11/30/09 1600

Total

Parameter	Result	Qual	Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by EE	RF C-01-1		p	Ci/g	Batch :	9336123	Yld %
Carbon 14	13.6		1.6	5.0	1.0	12/02/09	12/03/09

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

## Radiochemistry

Lab Sample ID: F9K300455-011

Work Order: Matrix:

LP9AT SOLID

Date Collected:

11/06/09 1045

Date Received:

11/30/09 1600

Total

Parameter	Result	Qual	Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by EERF C-01-1			pq	Ci/g	Batch	# 9336123	Yld %
Carbon 14	1.84	J	0.73	5.00	1.0	12/02/09	12/03/09

MDC is determined by instrument performance only. Bold results are greater than the MDC.

Data are incomplete without the case narrative.

Result is greater than sample detection limit but less than stated reporting limit.

## Radiochemistry

Lab Sample ID: F9K300455-012

Work Order: Matrix:

LP9AV SOLID Date Collected:

11/06/09 1055

Date Received:

11/30/09 1600

Total	

			Uncert.			Prep	Analysis
Parameter	Result	Qual	(2 g+/-)	RL	mdc	Date	Date
Carbon 14 by E	ERF C-01-1		p	Ci/g	Batch	# 9336123	Yld %
Carbon 14	4.47	J	0.94	5.00	1.0	12/02/09	12/04/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# TestAmerica Connecticut Client Sample ID: ES-SU009-S-32

#### Radiochemistry

Lab Sample ID: F9K300455-013

Work Order: Matrix:

LP9AX SOLID Date Collected:

11/06/09 1125

Date Received:

11/30/09 1600

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mđc	Prep Date	Analysis Date
Carbon 14 by E	ERF C-01-1		pq	Ci/g	Batch	# 9336123	Yld %
Carbon 14	1.55	J	0.71	5.00	1.0	12/02/09	12/04/09

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

Result is greater than sample detection limit but less than stated reporting limit.

# Client Sample ID: ES-SU009-S-36

#### Radiochemistry

Lab Sample ID: F9K300455-014

Work Order: Matrix:

LP9A0 SOLID Date Collected:

11/06/09 1110

Date Received:

11/30/09 1600

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Carbon 14 by E	ERF C-01-1		I	Ci/g	Batch	# 9336123	Yld %
Carbon 14	0.62	U	0.64	5.00	1.0	12/02/09	12/04/09

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# TestAmerica Connecticut Client Sample ID: ES-SU009-S-36 A

#### Radiochemistry

Lab Sample ID: F9K300455-015

Work Order: Matrix:

LP9A1 SOLID Date Collected:

11/06/09 1110

Date Received:

11/30/09 1600

Tota1
77 t-

			Total Uncert.			Prep	Analysis
Parameter	Result	Qual	(2 <sub>0</sub> +/-)	RL	mdc	Date	Date
Carbon 14 by EE		-	p	Ci/g	Batch #	9336123	Yld %
Carbon 14	0.97	U	0.66	5.00	1.0	12/02/09	12/04/09

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

#### METHOD BLANK REPORT

#### Radiochemistry

Client Lot ID:

F9K300455

Matrix:

SOLID

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	MDC		Prep Date	Lab Sample ID Analysis Date
Carbon 14 by	EERF C-01-1		pCi/g	Batch #	9336123	Yld %	T	F9L020000-123B
Carbon 14	0.28	Ū	0.61	5.00	1.0		12/02/09	

NOTE(S)

Data are incomplete without the case narrative.

 $\ensuremath{\mathtt{MDC}}$  is determined using instrument performance only Bold results are greater than the  $\ensuremath{\mathtt{MDC}}.$ 

# Laboratory Control Sample Report

# Radiochemistry

Client Lot ID:

F9K300455

Matrix:

SOLID

			Total		Lab	Sample ID
Parameter	Spike Amount	Result	Uncert. (2 g+/-)	MDC	% Yld % Rec	QC Control Limits
Carbon 14 by EE	RF C-01-1		pCi/g	C-01-1	F9L(	020000-123C
Carbon 14	73.2	56.4	4.8	1.0	77	(62 - 109)
	Batch #:	9336123		Analysis D	ate: 12/03/09	

#### DUPLICATE EVALUATION REPORT

#### Radiochemistry

Client Lot ID:

F9K300455

Matrix:

SOLID

Date Sampled:

11/06/09

Date Received: 11/30/09

	SAMPLE		Total Uncert.		DUPLICATE	Total Uncert.	(	QC Sample ID	
Parameter	Result		(2 0 +/-)	% Yld	Result	(2 σ+/-)	% Yld	Precisio	n
Carbon 14 by E	ERF C-01-1			pCi/g	C-01-1		F9	K300455-00	3
Carbon 14	1.70	J	0.72		<b>2.24</b> J	0.77		27	%RPD
	70-4	ch #:	9336123	(Sample)					

NOTE(S)

Data are incomplete without the case narrative. Calculations are performed before rounding to avoid round-off error in calculated results

Result is greater than sample detection limit but less than stated reporting limit. Page 55 of 64

#### MATRIX SPIKE REPORT

#### Radiochemistry

Client Lot Id:

F9K300455

Matrix:

SOLID

Date Sampled:

11/06/09

Date Received:

11/30/09

			Total			Total		QC Sample	∍ ID
Parameter	Spike Amount	Spike Result	Uncert. (2g+/-)	Spike Yld.	Sample Result	Uncert.	%YLD	%REC	QC Control Limits
Carbon 14 by EERF	C-01-1		pCi/g	C-	01-1		F	9K300455	5-003
Carbon 14	291	246	21		1.70	0.72		84	(78 - 110)
	Batch #:	9336123	An	alysis I	Date:	12/03/09			(

NOTE(S)

Data are incomplete without the case narrative.

Calculations are performed before rounding to avoid round-off errors in calculated results.



# REANALYSIS / SUB-CONTRACT / CLIENT RETURN FORM

Requ	uest Initiated by: Request Date:		Clay I1-30-09
	Quote Number:		
Return Rear Sub-	is for (check one): rn to Client – (Client FedE nalysis Contract Sample ional Analysis		New Lot (check one):
Cliant ID	Old Lot Number:		Line item from quote
Client ID See Attached	Sampled date/time*	Shell Location	(include Rad Screen if required) C-14
* or attach or	iginal Chain of Custody	Date for New Lo	nin:
	Analytical 12-04-09	Date for New Los	Report 12-07-09
	For Sub-Cont	ract or Return to	Client ONLY
S	hipping Address:		
	Contact Person: Phone Number:		
	Project Manager Signa	ature:	
	DO NOT HAVE LA	AB PULL OR	IGINAL SAMPLE
Comple	eted by: Unglis	oon	
New Login	Lot Number: F9K3	300 455	(place copy of this form in old file)
Initial that	Containers were Re-lat	peled: #\f\$	(place below lot number of old label)

Page 57 of 64 57 of 176

America Connecticut  og Hill Cross Road  of CT 06484			Ö	hain of	Chain of Custody Record	ord $\mathcal L$	D38	×	<b>ESTAT</b>	TestAmerica HICLIFAGER IS ENVIRONMENTAL TENTHO
(203) 929-8140 Fax (203) 929-6142	Sampler:			Lab PM: Arasafe	Lab PM: Arasate, Erin A	Camie	Camier Tracking No(s);	22	COC No: 220-4471.1	
nad nad ng/Receiving	Phone:			E-Mail: erin.ara	e-Mail: enin.arasate@testamencainc.com	E		8 0	Page: Page 1 of 2	
y: perios Laboratories. Inc.					Ans	Analysis Requested	sted	× 27	Job #: 220-10654-1 🔸	
Rider Trail North	Due Date Requested: 11/25/2009								Š	es; M - Hexane
r4t,	TAT Requested (day	: <b>(\$</b> ):						w C	4 cetate	N - None O - AsNaO2
p. p. p. p. p. p. p. p. p. p. p. p. p. p									- Nitric Acid - Nalisoa - Mach	P - Na204S Q - Na2SO3 R - Na2S2SO3
18-8566(Tel) 314-298-8757(Fax)	PO#:			THE CO.					nchlor corbic Acid	S - H2SO4 T - TSP Dodecahydrate
	:#OM								'n	C - ACCOUNT V - MCAA
dane:	Project #: 22002640								<u> </u>	Z - other (specify)
	SSOW#:								Others	
		Sample	mple rpe comp,	Matrix (www.	АЯТИОЭВП			equell lec	an Jejones	. AtoName(Note)
(G) le Identification - Client ID	Sample Date	IIIIe Ga	TOWNS I	A Table Frank Awar				<b>国格里斯</b> 尔尼	Special III	
ES-SU009-S-01		9:00		Solid	×				6	80 P
ES-SU009-S-02	11/6/09	9:10		Solid	×					each
6 ES-SU009-S-03	11/6/09	9:20		Solid	×			0-05 U		
4-S-50009-S-04	11/6/09	9:30		Solid	×					
ES-SU009-S-05	11/6/09	9:40		Solid	×					}
ES-SU009-S-11	11/6/09	9:55		Solid	×			ilas		
ES-SU009-S-12	11/6/09	10:05		Solid	×					
ES-\$U009-S-17	11/6/09	10:15		Solid	×					
ES-SU009-S-19	11/6/09	10:25		Solid	×			XII.		
ES-SU009-S-20	11/5/09	10:35		Solid	×					
ES-SU009-S-26	11/6/09	10:45		Solid	×					
ible Hazard Identification Non-Hazard Planmable Skin Initiant Poperable Requested: I, II, III, IV, Other (specify)	Poison B Unknown		Radiological	Je.	Sample Disposal ( A fee may be assessed if samples are refained longer than 1 month)  Return To Client Disposal By Lab Archive For Mon Special Instructions/QC Requirements:	fee may be asset t Disp Requirements:	ssed if sample osal By Lab	es are refaine	tained longer than 1 Archive For	month) Months
v Kir Rejing ished by		Date:			Time:		Method of Shipment	rent:		
7 A Daish 12/	Date/Time:	ہے [	(Fire)	Company	Received by:	del	Data	Date/finds:   69	0410	Company
	J			Company	13		Date	_		Соптелу
O District by:	Date/Time:			Company	Received by:			Date/Time:		Company
6 stody Seals Intact: Custody Seal No.:					Cooler Temperature(s) °C and Other Remarks:	°C and Other Remar	ks;			

D - Ashaoz P - NazoaS P - Nazosos R - Nazososos S - HzSo4 T - TSP Dodecahydrate U - Accade W - Ph 4-5 Z - other (specity) THE LEADER IN ENVIRONMENTAL TESTING **TestAmerica** Months Company Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Return To Client Disposal By Lab Archive For Mont Preservation Codes: 8/C Job #: 220-10654-1 Page: Page 2 of 2 220 4471.2 00 THE STREET OF STREET OF STREET Date/Time/ Date/Time: Method of Shipment Carrier Tracking No(s): **Analysis Requested** Dooler Temperature(s) °C and Other Remarks: Special Instructions/QC Requirements Chain of Custody Record erin.arasate@testamericainc.com Received by. × × × × SUBCONTRACT/ DOE H3\_04\_RG - THEILM Lab PM: Arasate, Erin A Time: E-Mail: G=grab) er-nsum A-A Matrix Solid Solid Solid Solid Sompany Сотрапу Rediological Type (C≖comp, Sample Sample 11:25 11:10 11:10 10:55 Unknown 11 - 10- 8 (AT Requested (days): Due Date Requested: 11/25/2009 Sample Date 11/6/09 11/6/09 11/6/09 11/6/09 Project #: 22002640 SSOW#. Date/Time: Poison B # OM æ 8 Skin Irritant Information (Sub Contract Lab) grable Requested: I, III, III, IV, Other (specify) Custody Seal No.: (703) 929-8140 Fax (203) 929-8142 ES-SU009-S-36 A ES-SU009-S-36 ES-SU009-S-30 ES-SU009-S-32 8-8566(Tel) 314-298-8757(Fax) America Connecticut Von-Hazard Teammable e Identification - Cilent 1D the Hazard Identification erica Laboratories, Inc. O O oriened by:
O stoody Solaits Inted:
O Yes o No y Kit Relinquished by. ng Hill Cross Road Rider Trail North, 12/08 CT 06484 g/Receiving Jame: of 64 Page 59

TestAme	Prica Lota	<del>/</del> (s): _	F9K1104	\$5	
		. —			
THE LEADER IN ENVIRONM		_			
<b>-</b>	JPON RECEIPT FORM	_	·····		
Client:	JA Coun	-			
Quote No:			38		
COC/RFA No:	220-44711/220-44711	χ	. 1	1	
Initiated By:		-	ate:	11/09 T	ime: <u>09/0</u>
_	<u> </u>		formation /		11 (1)
• • • • • • • • • • • • • • • • • • • •	edEx UPS DHL Courier Clien	nt Ot	ther;	<del></del>	ple Packages: Y N
Shipping # (s):*				Sample Temper	
,	7055 0386 6.				6
2	7,				7.
3.	· 8.			3	
4.	9,			4	9,
5	10.				
Numbered shipping lines	correspond to Numbered Sample Temp lines	**San varian	nple must be received ace does NOT affect	d at 4°C ± 2°C- If not, n the following: Metals-L	ote contents below. Temperature iquid or Rad tests- Liquid or Solids
	for yes, "N" for no and "N/A" for not applicable):  Are there custody seals present on the	7	1		Y
1. (Y) N	cooler?	8.	Y(N)		seals present on bottles?
2. Y (N) N/A	Do custody seals on cooler appear to be tampered with?	9.	Y N (N/A)	tampered with?	on bottles appear to be
3. (Ŷ) N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N N/A	Was sample recei make note below)	ved with proper pH'? (If not,
4. (Ŷ) N	Sample received with Chain of Custody?	11.	(Y) N	•	n proper containers?
5, 🕎 N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	Y N NA	Headspace in VO (If Yes, note sample l	A or TOX liquid samples?  D's below)
6. (Ý) N	Was sample received broken?	13.	Y N N/A	Was Internal COC	C/Workshare received?
7. (Y) N	ls sample volume sufficient for analysis?	14.	Y N AVA		original TestAmerica lab?
	ANL, Sandia) sites, pH of ALL containers received r	nust be v	verified, EXCEPT V	OA, TOX and soils.	
Notes:	* E.S-SU00	7 -	5 - 7 - 2		
	received he				
	aut () (SO)		· · · · · · · · · · · · · · · · · · ·		
	100 in 500				
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	C. WARRY 14 D	VVV	upes a	udelo	1000
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Corrective Action:		· · · <del>- · · ·</del>		<u>,</u>	,
☐ Client Contact N			Informed by:		
<ul><li>☐ Sample(s) proce</li><li>☐ Sample(s) on ho</li></ul>		If rele	eased, notify:	_	<i></i>
Project Management			Date:	11-	16.07
THIS FORM MUST BE	COMPLETED AT THE TIME THE ITEMS ARE BIT THAT PERSON IS REQUIRED TO APPLY THE	EING CI R INITI	HECKED IN. IF AN	Y ITEM IS COMPLET E NEXT TO THAT ITE	ED BY SOMEONE OTHER THAN M.

ADMIN-0004, REVISED 10/21/08 \\SIsvr01\QA\FORMS\ST-LOUIS\ADMIN\Admin004 rev11.doc

# MISCELLANEOUS DOCUMENTS

128 Long Hill Cross Road

Shelton, CT 06484

# **Chain of Custody Record**

**TestAmerica** 

Shelto	Shelton, CT U5484 Phone (203) 929-8140 Fax (203) 929-8142											THE LEADER IN ENVIRONMENTAL TESTING	ENVIRONM	ENTAL TESTING
Client	Client Contact: DAvis	Field Sample	Fieldsampler: 1 Owen	wen		TAT Req	TAT Required (business days):	usiness c	lays):		Lab PM/Contact:			COC Number: 12420
Comp		Mobile/Field	Number:	Jo - 2362		E	4	2			Lab Job Num	Lab Job Number (Lab Use Only):		Page 1 of 2
Addre	Address: 121.05 11/15+ 913 60001	E-Mail:		10,000	,	Delivera	Deliverable Type (Report/EDD):	(Report/	EDD):		1	7500)		Carrier Tracking
City, S	City, State, Zip:	PO #:	PO#:	The Land	3	Sample	Sample Disposal: [ ] Return to Client X Disposal by Lab	:[]Retu	rn to Clie	Ę	Cooler Tempe	( ) No ( ) No ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (		NOTES:
Phone	Phone: (845) 765- 71/2	,#OM				[ ] Archive for (A fee may be a	[ ] Archive for Months (A fee may be assessed if samples are	Months sessed if s	amples &	<u>=</u>	1	# 460 I Bon #	1#4	
	2 DAVIS @ BURNASILUTA COM	Project #:				State Re	State Regulatory QC Criteria	QC Crite	ioratra) <b>ria</b>		Analysis (	Analysis (Attach list if more space is needed)	needed)	
蹅	Project Name/Site Location (State):	SSOW#:				Requirements:	ments: 🗡	. <b>₹</b>						
22		**,	\$ **		,	No	No. of Containers/Preservatives	ainers/Pr	eservati	ves	£			Comments
#VI	Field Sample Identification (Containers for each sample may be combined on one line)	Collection Date	Collection Time (24-Hour Clock)	Matrix Aq=Aqueous. S=Solid, W=Waste/Oil. O=Other	MS/ MSD (Yes or No)	Unpreserved	HZSO4	нсг	HOBN	HO8N\pAnZ	Q,, H.			
- <del>6</del> 2	10-5-20005-5-51	\$0/7/11	0060	8	on	×					×			
ek.	25-54009-5-02	11/4/09 0910	0360	ν.	e)	×					×			
136	ES -54007-5-03	1.1/69 0920	orro	V	20	×					×			
5	£5-54009-5-04	11/1/19 0930	0430	N	οh	>					×			
5	ES-54009-5-05	11/6/09 0940	0770	V	00	>					×			
Q	ES-54009-5-11	11/6/09	5520	V	an	<b>×</b>					×			
4	B-54-609-5-12	11/1/10	2001	N	Se Se	~					*			
&	B-S4009-5-17	50/1/11	5/0/	Ŋ	an	- <b>X</b>					×			7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
0	ES-54009-5-19	11/109	5201	ч	an O	×					×			
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	of the polytical of the		11/ 60	1400	Company		Rece	Received by	N'	The state of	D	Date Time: 9-09	9518 60-	Company TT
8/2 Beling Welling	.kg.peq pà: / <b>2</b>	Date/Time:	`		Company		Rece	Received by:				Date/Time:		Сотрапу
Commonts:	<b>6</b> 0∂ts:													

Field Sampling / Shipping Instructions and Laboratory Sample Receipt Policy included on Reverse Side of COC

DISTRIBUTION: WHITE - Stays with the Samples; CANARY - Returned to Client with Report, PINK - Field Copy

TAL-0015 (0609)

128 Long Hill Cross Road

Shelton, CT 06484 Phone (203) 929-8140 Fax (203) 929-8142 Client Contact:

**Chain of Custody Record** 

**TestAmerica** 

THE LEADER IN ENVIRONMENTAL TESTING

<u>할</u>	Client Contact:	Field Sampler;		Ducine		TAT Required (business days):	uired (b	usiness	days):		Lab PIV	Lab PM/Contact:				8	COC Number: 19491	121
S E O	Company:	Mobile/Fiel	Mobile/Field Number:	13/2		7	j	•			Lab Jo	Numbe	ab Job Number (Lab Use Only).	Onty):		å	Page 2 of 2	1
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χ΄ Ö	State, Zip:	PO #:				Sample	Sample Disposal:	Sample Disposal: [ ] Return to Client	m to Cli	ent	, Kes	0 [ ]	2					
Phor	1 5	WO #:		!		Jarchik   Jarchik   Afee ma	I Disposal by Lab Archive for Months A fee may be assessed it	L f Disposal by Lab [ ] Archive for Months (A fee may be assessed if samples are	amples	are	Cooler		Cooler Temperatures (Lab Use Only):		## / ## /			
Ema	======================================	Project #:				retained	or longe	retained for longer than 1 month)	onth)		Ana	Avsis (A)	tach list if	more sna	Analysis (Attach list if more snace is needed)	- -		
n	sookis accomplish, em					State Re	gulatory	State Regulatory QC Criteria	ria									
ĒQ	Project Name/Site Location (State):  Digital Control (State):	SSOW#:				Requirements:		<b>4</b>										
, .						No.	of Cont	No. of Containers/Preservatives	eservat	ives	2						Comments	·
	Field Sample Identification	Collection	Callection Time (24-Hour	Matrix Aq=Aqueous, S=Solid.	CSW/SW	peviese			HC	HOBN\0	H H							
# <b>∀</b> ⊥	(Containers f	Date	Clock)	v=vvasteroii, O=Other	(Yes or No)	du∩	SZH	HCF	OgN		7							
<b>-6</b> 3	£5-54009.5-26	11/1/04	1645	>	No	×					×	-						
06	(A) ES-S4009-5-30	11/6/09	/ass	8	20	×					×							
1,76	\$ 125-54009-5-32	3211 6/19/11	5211	S	or	<b>×</b>			<u> </u>		×		_					
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# **Login Sample Receipt Check List**

Client: Energy Solutions, LLC

Job Number: 220-10654-1

SDG Number: 220-10654

List Source: TestAmerica Connecticut

Login Number: 10654 Creator: Faiella, Tim List Number: 1

Question	T / F/ NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	
Cooler Temperature is recorded.	True	11.6C
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Is the Field Sampler's name present on COC?	True	
Sample Preservation Verified	N/A	



TestAmerica Laboratories, Inc.

# ANALYTICAL REPORT

Lenexa, KS

Lot #: F9L090427

TestAmerica Connecticut

TestAmerica Connecticut 128 Long Hill Cross Road Shelton, CT 06484

TESTAMERICA LABORATORIES, INC.

Project Manager

December 16, 2009

#### **METHODS SUMMARY**

#### F9L090427

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Carbon 14 by LSC Percent Moisture Tritium by LSC	EERF C-01-1 MCAWW 160.3 MOD EML H3-04-RC MO	MCAWW 160.3 MOD

#### References:

EERF

EERF

EML

"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"

HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

MCAWW

"Methods for Chemical Analysis of Water and Wastes",  ${\tt EPA-600/4-79-020}$ , March 1983 and subsequent revisions.

#### **SAMPLE SUMMARY**

#### F9L090427

<u>WO # 8</u>	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LQQQJ	001	ES-SU009-S-6 (220-10920-1)	12/03/09	
LQQQ5	002	ES-SU009-S-7 (220-10920-2)	12/03/09	
LQQQ8	003	ES-SU009-S-8 (220-10920-3)	12/03/09	07:10
LQQQ9	004	ES-SU009-S-9 (220-10920-4)	12/03/09	07:15
LQQRA	005	ES-SU009-S-10 (220-10920-5)	12/03/09	07:20
LQQRE	006	ES-SU009-S-13 (220-10920-6)	12/03/09	07:25
LQQRF	007	ES-SU009-S-16 (220-10920-7)	12/03/09	07:30
LQQRG	008	ES-SU009-S-23 (220-10920-8)	12/03/09	07:35
LQQRJ	009	ES-SU009-S-24 (220-10920-9)	12/03/09	07:40
LQQRK	010	ES-SU009-S-25 (220-10920-10)	12/03/09	07:45
LQQRL	011	ES-SU009-S-27 (220-10920-11)	12/03/09	07:50
LQQRN	012	ES-SU009-S-28 (220-10920-12)	12/03/09	07:55
LQQRP	013	ES-SU009-S-29 (220-10920-13)	12/03/09	08:00
LQQRQ	014	ES-SU009-S-31 (220-10920-14)	12/03/09	08:05
LQQRR	015	ES-SU009-S-34 (220-10920-15)	12/03/09	08:10
LQQRT	016	ES-SU009-S-35 (220-10920-16)	12/03/09	08:15
LQQRV	017	ES-B-S-10 (220-10920-17)	12/03/09	

#### NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

# Case Narrative LOT NUMBER: F9L090427

This report contains the analytical results for the 17 samples received under chain of custody by TestAmerica St. Louis on December 9, 2009. These samples are associated with your Lenexa, KS project.

The analytical results included in this report meet all applicable quality control procedure requirements.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. **TestAmerica St. Louis' Florida certification number is E87689.** The case narrative is an integral part of this report.

This report shall not be reproduced, except in full, without the written approval of the laboratory.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

#### Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

There are no observations or nonconformances associated with the analysis in this lot.

#### Client Sample ID: ES-SU009-S-6 (220-10920-1)

#### Radiochemistry

Lab Sample ID: F9L090427-001

Matrix:

Work Order:

LQQQJ

SOLID

Date Collected:

12/03/09 0700

Date Received:

12/09/09 0910

Total

Parameter	Result	Qual	Uncert. (2 <sub>0</sub> +/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC by	DOE H3-04-R	C MOD.	p(	Ci/g	Batch #	9343301	Yld %
Tritium	0.04	υ	0.18	2.00	0.33	12/10/09	12/11/09
Carbon 14 by EERF	C-01-1		pQ	Ci/g	Batch #	9345145	Yld %
Carbon 14	4.37	J	0.95	5.00	1.1	12/11/09	12/12/09

#### NOTE(S)

Data are incomplete without the case narrative.

- Result is greater than sample detection limit but less than stated reporting limit.
- Result is less than the sample detection limit.

# Client Sample ID: ES-SU009-S-7 (220-10920-2)

#### Radiochemistry

Lab Sample ID: F9L090427-002

Work Order: Matrix:

LQQQ5 SOLID Date Collected: 12/03/09 0705 Date Received: 12/09/09 0910

12/	09/	09	09.

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	p	Ci/g	Batch #	9343301	Yld %
Tritium	-0.0007	U	0.18	2.00	0.33	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		p	Ci/g	Batch #	9345145	Yld %
Carbon 14	9.2		1.3	5.0	1.1	12/11/09	12/12/09

#### NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

Result is less than the sample detection limit.

# Client Sample ID: ES-SU009-S-8 (220-10920-3)

#### Radiochemistry

Lab Sample ID: F9L090427-003

Work Order: Matrix:

LQQQ8

SOLID

Date Collected:

12/03/09 0710

Date Received:

12/09/09 0910

Total	
Uncert	

			Uncert.			Prep Date	Analysis Date
Parameter	Result	Qual	(2 σ+/-)	RL	mdc	Date	Date
Tritium by LSC	by DOE H3-04-RC	MOD.	I	Ci/g	Batch #	9343301	Yld %
Tritium	-0.21	U	0.15	2.00	0.33	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		I	Ci/g	Batch #	9345145	Yld %
Carbon 14	5.2		1.0	5.0	1.1	12/11/09	12/12/09

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

#### Client Sample ID: ES-SU009-S-9 (220-10920-4)

#### Radiochemistry

Lab Sample ID: F9L090427-004

Work Order: Matrix:

LQQQ9

SOLID

Date Collected:

12/03/09 0715

Date Received:

12/09/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	p	Ci/g	Batch #	9343301	Yld %
Tritium	-0.13	υ	0.16	2.00	0.33	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		p	Ci/g	Batch #	9345145	Yld %
Carbon 14	6.8		1.1	5.0	1.1	12/11/09	12/12/09

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-10 (220-10920-5)

#### Radiochemistry

Lab Sample ID: F9L090427-005

Matrix:

Work Order:

LQQRA SOLID

Date Collected:

12/03/09 0720

Date Received:

12/09/09 0910

Total
-------

Parameter	Result	Qual	Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	p	Ci/g	Batch #	9343301	Yld %
Tritium	0.02	ŭ	0.19	2.00	0.33	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		þ	Ci/g	Batch #	9345145	Yld %
Carbon 14	1.86	J	0.78	5.00	1.1	12/11/09	12/12/09

#### NOTE(S)

Data are incomplete without the case narrative.

Result is greater than sample detection limit but less than stated reporting limit.

Result is less than the sample detection limit.

# Client Sample ID: ES-SU009-S-13 (220-10920-6)

#### Radiochemistry

Lab Sample ID: F9L090427-006

Work Order: Matrix:

LOORE

SOLID

Date Collected:

12/03/09 0725

Date Received:

12/09/09 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date	
Tritium by LSC	by DOE H3-04-RC	MOD.	Ė	Ci/g	Batch #	9343301	Yld %	
Tritium	-0.05	ŭ	0.18	2.00	0.34	12/10/09	12/11/09	
Carbon 14 by E	ERF C-01-1		F	Ci/g	Batch #	9345145	Yld %	
Carbon 14	1.99	J	0.78	5.00	1.1	12/11/09	12/12/09	.,

NOTE(S)

Data are incomplete without the case narrative.

- Result is greater than sample detection limit but less than stated reporting limit.
- Page 1 to loss than the sample detection limit.

Client Sample ID: ES-SU009-S-16 (220-10920-7)

#### Radiochemistry

Lab Sample ID: F9L090427-007

Work Order: Matrix:

LOORF

SOLID

Date Collected:

12/03/09 0730

Date Received:

12/09/09 0910

	_	 •			-,	_	_	,	_	_	

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	P	Ci/g	Batch #	9343301	Yld %
Tritium	6.21		0.67	2.00	0.32	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		p	Ci/g	Batch #	9345145	Yld %
Carbon 14	0.38	υ	0.65	5.00	1.1	12/11/09	12/12/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

# Client Sample ID: ES-SU009-S-23 (220-10920-8)

#### Radiochemistry

Lab Sample ID: F9L090427-008

Work Order: Matrix:

LQQRG

SOLID

Date Collected:

12/03/09 0735

Date Received:

12/09/09 0910

_	-		

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	p(	Ci/g	Batch #	9343301	Yld %
Tritium	1.16	J	0.30	2.00	0.32	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		p(	Ci/g	Batch #	9345145	Yld %
Carbon 14	0.28	U	0.65	5. <b>0</b> 0	1.1	12/11/09	12/12/09

#### NOTE (S)

Data are incomplete without the case narrative.

- Result is greater than sample detection limit but less than stated reporting limit.
- Possile to lass than the sample detection limit

# Client Sample ID: ES-SU009-S-24 (220-10920-9)

#### Radiochemistry

Lab Sample ID: F9L090427-009

Matrix:

Work Order:

LOORJ SOLID

Date Collected:

12/03/09 0740

Date Received:

12/09/09 0910

Parameter	Result	Qual	Total Uncert. (2 <sub>G</sub> +/-)	RL	mdc	Prep Date	Analysis Date
<del></del>		-				9343301	Yld %
Tritium by LSC	by DOE H3-04-RC	MOD.	I	pCi/g	Baccii #		
Tritium	0.22	Ū	0.21	2.00	0.33	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		I	pCi/g	Batch #	9345145	Yld %
Carbon 14	1.20	J	0.72	5.00	1.1	12/11/09	12/12/09

NOTE(S)

Data are incomplete without the case narrative.

Result is greater than sample detection limit but less than stated reporting limit.

Possit is loss than the sample detection limit.

Client Sample ID: ES-SU009-S-25 (220-10920-10)

#### Radiochemistry

Lab Sample ID: F9L090427-010

Work Order: Matrix:

SOLID

LOORK

Date Collected:

12/03/09 0745

Date Received:

12/09/09 0910

Parameter	Result	Qual	Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.	pQ	i/g	Batch #	9343301	Yld %
Tritium	0.07	ΰ	0.19	2.00	0.32	12/10/09	12/11/09
Carbon 14 by E	ERF C-01-1		pQ	:i/g	Batch #	9345145	Yld %
Carbon 14	4.68	J	0.99	5.00	1.1	12/11/09	12/12/09

#### NOTE(S)

Data are incomplete without the case narrative.

Result is greater than sample detection limit but less than stated reporting limit.

Regult is less than the sample detection limit

Client Sample ID: ES-SU009-S-27 (220-10920-11)

#### Radiochemistry

Lab Sample ID: F9L090427-011

Work Order:

Matrix:

LQQRL

SOLID

Date Collected:

12/03/09 0750

Date Received:

12/09/09 0910

Total

Parameter	Result	Qual	Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC b	y DOE H3-04-R0	C MOD.	pc	Ci/g	Batch #	9343302	Yld %
Tritium	0.39	J	0.21	2.00	0.29	12/11/09	12/12/09
Carbon 14 by EER	F C-01-1		pq	Ci/g	Batch #	9345145	Yld %
Carbon 14	0.69	U	0.67	5.00	1.1	12/11/09	12/12/09

#### NOTE (S)

Data are incomplete without the case narrative.

- Result is greater than sample detection limit but less than stated reporting limit.
- Result is less than the sample detection limit.

Client Sample ID: ES-SU009-S-28 (220-10920-12)

#### Radiochemistry

Lab Sample ID: F9L090427-012

Date Collected:

12/03/09 0755

Work Order:

LQQRN

Date Received:

12/09/09 0910

Matrix:

SOLID

Parameter	Result	Qual	Total Uncert. (2 g+/-)	· RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-RC	MOD.		pCi/g	Batch #	9343302	Yld %
Tritium	0.91	J	0.26	2.00	0.28	12/11/09	12/12/09
Carbon 14 by EE	RF C-01-1			pCi/g	Batch #	9345145	Yld %
Carbon 14	0.17	U	0.65	5.00	1.1	12/11/09	12/12/09

NOTE(S)

Data are incomplete without the case narrative.

Result is greater than sample detection limit but less than stated reporting limit.

named to lose than the sample detection limit

# Client Sample ID: ES-SU009-S-29 (220-10920-13)

#### Radiochemistry

Lab Sample ID: F9L090427-013

Work Order: Matrix:

LQQRP SOLID

Date Collected:

12/03/09 0800

Date Received:

12/09/09 0910

Parameter	Result	Qual	Uncert. (2 g+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC	by DOE H3-04-R0	MOD.	po	Ci/g	Batch #	9343302	Yld %
Tritium	0.79	J	0.25	2.00	0.29	12/11/09	12/12/09
Carbon 14 by E	ERF C-01-1		po	Ci/g	Batch #	9345145	Yld %
Carbon 14	0.41	บ	0.66	5.00	1.1	12/11/09	12/12/09
			_				

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

Result is greater than sample detection limit but less than stated reporting limit.

Yld %

12/11/09 12/12/09

#### TestAmerica Connecticut

# Client Sample ID: ES-SU009-S-31 (220-10920-14)

#### Radiochemistry

Lab Sample ID: F9L090427-014

Carbon 14 by EERF C-01-1

Work Order: Matrix:

Parameter Tritium by Tritium

Carbon 14

SOLID

3.56

LOORO

Date Collected:

12/03/09 0805

Date Received:

12/09/09 0910

Batch # 9345145

			Total Uncert.			Prep	Analysis
	Result	Qual	(2 σ+/-)	RL	mdc	Date	Date
LSC by	DOE H3-04-RC M	MOD.	pC	li/g	Batch #	9343302	Yld %
	-0.09	υ	0.15	2.00	0.31	12/11/09	12/12/09

pCi/g

5.00

0.91

#### NOTE(S)

Data are incomplete without the case narrative.

Result is greater than sample detection limit but less than stated reporting limit.

Pagult is loss than the sample detection limit

#### Client Sample ID: ES-SU009-S-34 (220-10920-15)

#### Radiochemistry

Lab Sample ID: F9L090427-015

Work Order:

LOORR

Matrix:

SOLID

Date Collected:

12/03/09 0810

Date Received:

12/09/09 0910

Parameter	, Result	Qual	Total Uncert. (2 <sub>O</sub> +/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC by	7 DOE H3-04-RC	MOD.	p	Ci/g	Batch #	9343302	Yld %
Tritium	-0.06	Ū	0.16	2.00	0.31	12/11/09	12/12/09
Carbon 14 by EER	F C-01-1		p	Ci/g	Batch #	9345145	Yld %
Carbon 14	1.90	J	0.77	5.00	1.1	12/11/09	12/12/09

#### NOTE (S)

Data are incomplete without the case narrative.

- Result is greater than sample detection limit but less than stated reporting limit.
- Possilt is loss than the sample detection limit

Client Sample ID: ES-SU009-S-35 (220-10920-16)

#### Radiochemistry

Lab Sample ID: F9L090427-016

Work Order: Matrix:

LQQRT

SOLID

Date Collected:

12/03/09 0815

Date Received:

12/09/09 0910

Total

Uncert. Analysis Prep (2 g+/-) Date Date Parameter Result Qual RЬ mdc Tritium by LSC by DOE H3-04-RC MOD. Batch # 9343302 Yld % pCi/g Tritium 0.06 2.00 0.30 12/11/09 12/12/09 IJ 0.17 Carbon 14 by EERF C-01-1 pCi/g Batch # 9345145 Yld % Carbon 14 0.67 U 5.00 1.1 0.68 12/11/09 12/12/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

#### Client Sample ID: ES-B-S-10 (220-10920-17)

#### Radiochemistry

Lab Sample ID: F9L090427-017

Work Order: Matrix:

LQQRV SOLID

Date Collected:

12/03/09 0000

Date Received:

12/09/09 0910

Total

Parameter	Result	Qual	Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Tritium by LSC by DOE H3-04-RC MOD.			pCi/g		Batch # 9343302		Yld %
Tritium	0.11	Ŭ .	0.17	2.00	0.29	12/11/09	12/12/09
Carbon 14 by EERF C-01-1			pCi/g		Batch # 9345145		Yld %
Carbon 14	5.4		1.0	5.0	1.1	12/11/09	12/12/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only. Bold results are greater than the MDC.

#### METHOD BLANK REPORT

#### Radiochemistry

Client Lot ID: F9L090427

Matrix:

SOLID

Parameter	Result	Qual	Total Uncert. (2 g+/-)	RL	MDC		Prep Date	Lab Sample ID Analysis Date
Tritium by LSC by	DOE H3-04-1	RC MOD.	pCi/g 0.14	Batch # 2.00	9343301	Yld %	12/10/09	'9L090000-301B 12/11/09
Tritium by LSC by	DOE H3-04-1	RC MOD.	pCi/g 0.15	Batch # 2.00	9343302 0.25	Yld %	_	'9L090000-302B 12/12/09
Carbon 14 by EERF	C-01-1 0.47	υ	pCi/g	Batch # 5.00	9345145	Yld %	F 12/11/09	°9L110000-145B 12/12/09

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only Bold results are greater than the MDC.

Result is less than the sample detection limit.

#### Laboratory Control Sample Report

#### Radiochemistry

Client Lot ID: F9L090427

SOLID

			Total		Lab	Sample ID
Parameter	Spike Amount	Result	Uncert.	MDC	% Yld % Rec	QC Control Limits
Tritium by LSC by	DOE H3-04-RC M	OD.	pCi/g	H3-04-RC MOD	F9L	090000-301C
Tritium	15.3	15.7	1.2	0.3	103	(75 - 104)
	Batch #:	9343301		Analysis Date:	12/11/09	
Tritium by LSC by	DOE H3-04-RC M	OD.	pCi/g	H3-04-RC MOD	F9L	090000-302C
Tritium	15.2	15.8	1.2	0.3	104	(75 - 104)
	Batch #:	9343302		Analysis Date:	12/12/09	i
Carbon 14 by EERF	C-01-1		pCi/g	C-01-1	F9L	110000-145C
Carbon 14	73.2	62.0	5.3	1.1	85	(62 - 109)
	Batch #:	9345145		Analysis Date:	12/12/09	

#### DUPLICATE EVALUATION REPORT

#### Radiochemistry

Client Lot ID: F9L090427

Matrix:

SOLID

Date Sampled: 12/03/09

Date Received: 12/09/09

Parameter	SAMPLE Result		Total Uncert. (2 g +/-)	% Yld	DUPLICATE Result	Total Uncert. (2 \sigma +/-)	% Yld	QC Sample ID Precisi	on
Tritium by LSC by	DOE H3-04	-RC MO	D.	pCi/g	H3-04-RC	MOD	F	9L090427-00	1
Tritium	0.04	U	0.18		-0.10 U	0.17		421	%RPD
	Bat	ch #:	9343301	(Sample)	9343301 (	Duplicate)			
Tritium by LSC by	DOE H3-04	-RC MO	D.	pCi/g	H3-04-RC	MOD	F	01090427-01	.1
Tritium	0.39	J	0.21		0.26 U	0.20		38	%RPD
	Bat	ch #:	9343302	(Sample)	9343302 (	Duplicate)			
Carbon 14 by EERF	C-01-1			pCi/g	C-01-1		F	0L090427-01	.1
Carbon 14	0.69	U	0.67		0.57 U	0.68		20	%RPD
	Bat	ch #:	9345145	(Sample)	9345145 (	Duplicate)			

NOTE (S)

Data are incomplete without the case narrative.

Calculations are performed before rounding to avoid round-off error in calculated results

Result is greater than sample detection limit but less than stated reporting limit.

#### MATRIX SPIKE REPORT

#### Radiochemistry

Client Lot Id:

F9L090427

Matrix:

SOLID

Date Sampled:

12/03/09

Date Received:

12/09/09

						QC Sample	e ID
Parameter	Spike Amount	Spike Result	Total Uncert. (2 <sub>0</sub> +/-)	Spike Sample Yld. Result	Uncert.	%YLD %REC	QC Control Limits
Tritium by LSC by DO	E H3-04-RC MC	DD.	pCi/g	H3-04-RC	MOD	F9L090427	7-002
Tritium	15.2	19.1	1.5	-0.000	7 0.18	126	(62 - 129)
	Batch #:	9343301	Ar	alysis Date:	12/11/09		
Carbon 14 by EERF C-	01-1		pCi/g	C-01-1		F9L090427	7-011
Carbon 14	293	241	21	0.69	0.67	82	(78 - 110)
	Batch #:	9345145	Ar	alysis Date:	12/12/09		
Tritium by LSC by DO	E H3-04-RC MC	DD.	pCi/g	H3-04-RC	MOD	F9L090427	7-012
Tritium	15.1	20.1	1.5	0.91	0.26	127	(62 - 129)
	Batch #:	9343302	Ar	alysis Date:	12/12/09		

NOTE(S)

Data are incomplete without the case narrative.

Calculations are performed before rounding to avoid round-off errors in calculated results.

**TestAmerica** T - TSP Dodecahydrate U - Acetone Special Instructions/Note: Z - other (specify) N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2SO3 Months Zampank Z S-H2S04 Company Company Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Return To Client Disposal By Lab Mont H - Ascorbic Acid Date/Time: 9099; 10 C - Zn Acetate D - Nitric Acid Page: Page 1 of 2 220-10920-1 Preservation COC No: 220-4645.1 E - NaHSO4 G - Amchlor J - DI Water A - HCL B - NaOH F - MeOH K-EDTA ÷ -Ψ. ~ Total Number of containers Date/Time: Method of Shipment: Analysis Requested Sooler Temperature(s) °C and Other Remarks: Special Instructions/QC Requirements: Chain of Custody Record るのく Lab PM: Arasate, Erin A E-Mail: erin.arasate@testamericainc.com ecceived by Received by: × × × × × × × × × × SUBCONTRACT/ C-01-1 - Carbon 14 × × × × × × × × × × × SUBCONTRACT/ DOE H3\_04\_RC - Tritium Perform MS/MSD (Yes or No) Time: Company Company Preservation Code: Matrix Solid Solid Solid Solid Solid Solid Solid Solid Solid Solid Solid Company Radiological Sample Type (C=comp, G=grab) 1207 Sample Time 7:00 7:05 7:10 7:15 7:30 7:35 7:40 7:45 7:50 7:20 7:25 Date: Unknown TAT Requested (days): Due Date Requested: 12/16/2009 Sample Date Date/Time: Date/Time: 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 Project #: 22002640 SSOW#: Date/Time: Phone: ₩O₩ # 0 Poison B Skin Irritant (Sub Contract Lab) Deliverable Requested: I, II, III, IV, Other (specify) ES-SU009-S-25 (220-10920-10) ES-SU009-S-27 (220-10920-11) ES-SU009-S-23 (220-10920-8) ES-SU009-S-24 (220-10920-9) ES-SU009-S-10 (220-10920-5) ES-SU009-S-13 (220-10920-6) ES-SU009-S-6 (220-10920-1) ES-SU009-S-7 (220-10920-2) ES-SU009-S-8 (220-10920-3) ES-SU009-S-9 (220-10920-4) ES-SU009-S-16 (220-10920-7) Custody Seal No.: ample Identification - Client ID (Lab ID) hone (203) 929-8140 Fax (203) 929-8142 hone: 14-298-8566(Tel) 314-298-8757(Fax) estAmerica Connecticut <sup>1</sup> Flammable ossible Hazard Identification estAmerica Laboratories, Inc. mpty Kit Relinquished by: 28 Long Hill Cross Road Custody Seals Intact: Δ Yes Δ No lient Information 3715 Rider Trail North, helton. CT 06484 hipping/Receiving Non-Hazard elinquished by: elinquished by: elinguished by: roject Name: enexa, KS tate, Zip: 10, 63045 ient Contact: arth City ompany:

P - Na2045 Q - Na2030 R - Na20503 S - L7304 T - TSP Dodecahydrate U - Acelone V - MCAA W - ph 4-5 **TestAmerica** THE LEADER IN ENVIRONMENTAL TESTING Special Instructions/Note: Z - other (specify) Months Company Company Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Return To Client Disposal By Lab Mont Job #: 220-10920-1 Preservation Codes: A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
F - NaHSO4
F - NaHSO4
G - Amchlor
H - Ascorbic Acid 0.6 Page: Page 2 of 2 COC No: 220-4645.2 J - DI Water K - EDTA L-EDA Other: 12-9-09 4 Total Number of containers Date/Time: Method of Shipment: Carrier Tracking No(s): **Analysis Requested** Cooler Temperature(s) °C and Other Remarks: Special Instructions/QC Requirements: Received by: Chain of Custody Record erin.arasate@testamericainc.com Return To Client Received by: × × × × × × SUBCONTRACT/ C-01-1 - Carbon 14 Lab PM: Arasate, Erin A E-Mail: × × × × × × SUBCONTRACT/ DOE H3\_04\_RC - Tritlum Time: Perform MS/MSD (Yes of No) Matrix Preservation Code Solid Solid Solid Solid Solid Solid Company Company Sompany Radiological G=grab) (C=comp, Sample Type 1507 Sample Time 8:15 7:55 8:00 8:05 8:10 Date: Unknown TAT Requested (days): Due Date Requested: 12/16/2009 ate/Time: R/8/09 Sample Date 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 12/3/09 Project #: 22002640 SSOW#: Date/Time: Phone: ₩O# ģ Poison B Skin Irritant lient Information (Sub Contract Lab) Jeliverable Requested: I, II, III, IV, Other (specify ES-SU009-S-28 (220-10920-12) ES-SU009-S-35 (220-10920-16) ES-SU009-S-29 (220-10920-13) ES-SU009-S-31 (220-10920-14) ES-SU009-S-34 (220-10920-15) ES-B-S-10 (220-10920-17) Custody Seal No.: ample Identification - Client ID (Lab ID) none (203) 929-8140 Fax (203) 929-8142 14-298-8566(Tel) 314-298-8757(Fax) estAmerica Connecticut Flammable Possible Hazard Identification estAmerica Laboratories, Inc. empty Kit Relinquished by: Custody Seals Intact: 28 Long Hill Cross Road 3715 Rider Trail North, Δ Yes Δ No hipping/Receiving Non-Hazard elinquished by: telinquished by: telinquished by: roject Name: enexa, KS late, Zip: 10, 63045 arth City

## **ENERGY SOLUTIONS, LLC**

**Kansas Site** 

STANDARD LEVEL IV REPORT OF ANALYSIS

**WORK ORDER #09-11114-OR** 

**December 8, 2009** 

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY OAK RIDGE, TN

#### TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
I	Chain of Custody	004
II	Sample Acknowledgement	009
Ш	Case Narrative	012
IV	Analytical Results Summary	015
$\mathbf{v}$	Analytical Standard	017
VI	Quality Control Sample Results Summary	024
VII	Laboratory Technician's Notes	029
VIII	Analytical Data (Tritium)	038
IX	Analytical Data (Carbon-14)	061
	Last Page Number 84	



Eberline Services Work Order #\_

#### STANDARD OPERATING PROCEDURE

Sample Receiving

MP-001, Rev. 10 Effective: 4/27/09 Page 13 of 13

083

## Eberline Services – Oak Ridge Laboratory LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

09

Date for Partial	Initials	Date	Initials	Checklist Item	s
		11-25-69	KF	Sample Log-In	
		12/1/09	KBS	Data Compilation	on
		12-109	nlT	First Technical	Data Review
		12/100	M	Second Technic	cal Data Review
		12/3/04	(X)	Data Entry/Elec	tronic Deliverable
		12/3/09	Sec.	Case Narrative	(
		12/08/09	EUT	Electronic Deliv	erable Proof
		12/8/09	a).H	Samples Analyz Yes?	zed within Holding Time
		12/8/09	Q.H-	QA/QC Review	
		11/27/09	MRM	Client in Posses Electronic or Ha	
				Invoiced by Lab	
Technical/Clerical	I Correction	s, Signatur	es Needed, P	roblems, Etc	Date/Initials
ackage approved by:	Laborato	pry Manager	1	Da	volslo1

SECTION I
CHAIN OF CUSTODY

TAT Required (business days):   Lab Job Number (Lab Les Only):   Deliverable Type (RéportEDD):   Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Les Only):   Passed Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Screen (Lab Let Zeroli Passed Red Recorred Dec Let Zeroli Passed Recorred Dec Let Zerol	Strellon, CT 06494 Phone (203) 929-8142	R. Sye, P. 37850	to rie co	Chain of Custody Record	THE LEADER IN	THE LEADER IN ENVIRONMENTAL TESTING
Sample Desposat: I Feutrn to Client  Sample Desposat: I Feutrn to Client  Notice and a seed and Screen (Lab Use Only):  Notice and a seed and Screen (Lab Use Only):  Notice and a seed and Screen (Lab Use Only):  Notice and a seed and seed and a seed and seed and a seed	tact:	03		Required (business days):		COC Number: 12423
Sample Disposal: [1 Re Sample Disposal: [1 Re Notifice of Months (A few may be assessed retained for longer than 1 State Regulatory QC Cr Requirements:    Mist Mist   Mis	secy Sou	ield Number:		3 day	Lab Job Number (Lab Use Only):	of 2
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Requirements:    Mist Mist Mist Mist Mist Mist Mist Mist	C SIMOZ	Project #:	State	Regulatory QC Criteria	Analysis (Attach list if more space is	(papaa)
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Company Received by:	Dr. 0	34	Company ES			Company
Fleid Copy	3	Dafe/Timé;	Сотрапу	Received by:		Company
	mments: TRIBUTION: WHITE - Stays with the Samples; CANARY - R	Returned to Client with Report; PINK	- Field Copy	Field Samolina / Shir	Company ( )	

The Requirement business tayay:   The	Phone (203) 929 8140 Fex (203) 920 8142			THE LEADER IN ENVIRONMENTAL TESTING	NMENTAL TESTING
Passed Flags Streen Lab Use Only;   Page 2   Passed Flags Streen Lab Use Only;   Page 2   Passed Flags Streen Lab Use Only;   Page 3   Passed Flags Streen Lab Use Only;   P	Client Contact:	Field Sampler;	TAT Required (business days):		COC Number: 19/193
Continue   Continue	Company:	Mobile/Field Number:		1	1 1
For processing   For	Address:	E-Mail:		1	Carrier Tracking
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Date/Time: Company Received by: Date/Time:	Relinquished by:	1		Date/Time:	Company

Field Sampling / Shipping Instructions and Laboratory Sample Receipt Policy included on Reverse Side of COC



## Internal Chain of Custody

Work Order #	09-11114
Lab Deadline	11/30/2009
Analysis	H0003 - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	44	D1.3
	05	49	D1.3
	06	36	D1.3
	07	43	D1.3
	08	56	D1.3
	09	49	D1.3
	10	45	D1.3
	11	41	D1.3
	12	40	D1.3
	13	31	D1.3
	14	53	D1.3
	15	42	D1.3

		Locatio	on (circle	one)	Ala	Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room O	Jakeli	11-25-09
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Madule	11-2509
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	PCB 111251	9 124
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	lew Muzil	11/27/09 1000
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	4	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		NATE AND A SECOND SECON
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Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
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## Internal Chain of Custody

Work Order #	09-11114
Lab Deadline	11/30/2009
Analysis	C0014 - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	44	D1.3
	05	49	D1.3
	06	36	D1.3
	07	43	D1.3
	08	56	D1.3
	09	49	D1.3
	10	45	D1.3
	11	41	D1.3
	12	40	D1.3
	13	31	D1.3
	14	53	D1.3
	15	42	D1.3
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Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
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Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

# SECTION II SAMPLE ACKNOWLEDGEMENT

Energy Solutions, LLC	ENC	Environmental	7	1/25/2009	Company Inc.	3	09-11114	1114	
Project Name	Client WO C14/Tritium Samples	Sample Disp	11	11/30/2009	12/01	12/01/2009	Client Deadline 12/01/2009	/2009	
Client ID	Sample Date Matrix	Storage	H0003			Estimate of the Control of the Contr			ijΤ
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	11/25/09 SO	D1.3	×		2 rate	¥-			7
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ES-SU009-S-21	11/24/09 07:15 SO	D1.3	×			E .			7
ES-B-S-1	11/24/09 07:20 SO	D1.3	×						7
ES-B-S-2	11/24/09 07:25 SO	D1.3	×						7
ES-B-S-3	11/24/09 07:30 SO	D1.3	×						7
ES-B-S-4	11/24/09 07:40 SO	D1.3	×	=					7
ES-B-S-5	11/24/09 07:45 SO	D1.3	×			A Property of the Property of			8
ES-B-S-6	11/24/09 08:00 SO	D1.3	×						7
ES-B-S-7	11/24/09 08:10 SO	D1.3	×		,,,,,,				2
ES-B-S-8	11/24/09 08:15 SO	01.3	×						7
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	Totals Per Analysis (non QA samples)	n QA samples)	12 12 0	0 0 0 0	0 0 0	0 0 0	0 0 0	0 0	0
A STANS	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830	oratory d. 37830	Invoice	Accounts Payable Energy Solutions, LLC 1009 Commerce Park Drive #100 Oak Ridge, TN 37830	Report Data	John Davis Energy Solutions, LLC 1009 Commerce Park Drive #100 Oak Ridge, TN 37830	or #100		
Sample Log In Report	Voice: (865) 48	1-0683	Voice	865-574-6517	Voice	Voice   865-765-7112 Fax			
	Fax: (865) 483-4621	3-4621	Contact	John Davis					
			Voice	865-765-7112					



#### STANDARD OPERATING PROCEDURE

Sample Receiving

MP-001, Rev. 10 Effective: 4/27/09 Page 12 of 13

#### Eberline Services - Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST MP-001-2

Received in good condition?  If aqueous, properly preserved  Present OF CUSTODY SEALS:  Present on outside of package?  Unbroken on outside of package?  Present on samples?  Unbroken on samples?  N  Unbroken on samples?  N  Unbroken on samples?  N  Was chain of custody present upon sample receipt?  N  THE RESPONSE TO ANY OF THE ABOVE IS NO, A DISCREPANT SAMPLE RECEIPT R  SR) HAS BEEN ISSUED.	MPLE MATRIX/MATRICES:	(CIRCI	LE ONE O	R BOTH)
Received in good condition?  If aqueous, properly preserved  PERE CHAIN OF CUSTODY SEALS:  Present on outside of package?  Unbroken on outside of package?  Present on samples?  N  Unbroken on samples?		AQUE	ous N	NON-AQUE
Received in good condition?  If aqueous, properly preserved  Y  N  WA  FERE CHAIN OF CUSTODY SEALS:  Present on outside of package?  Unbroken on outside of package?  Present on samples?  Unbroken on samples?  N  Unbroken on samples?  N  Was chain of custody present upon sample receipt?  THE RESPONSE TO ANY OF THE ABOVE IS NO, A DISCREPANT SAMPLE RECEIPT R SR) HAS BEEN ISSUED.	224.00	(CIRCI	LE EITHER	R YES, NO
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Present on samples?  Unbroken on samples?  Was chain of custody present upon sample receipt?  THE RESPONSE TO ANY OF THE ABOVE IS NO, A DISCREPANT SAMPLE RECEIPT R SR) HAS BEEN ISSUED.	Present on outside of package?	<b>(Y)</b>	N	
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THE RESPONSE TO ANY OF THE ABOVE IS NO, A DISCREPANT SAMPLE RECEIPT R SR) HAS BEEN ISSUED.	Was chain of custody present upon sample receipt?	B	N	
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	THE RESPONSE TO ANY OF THE ABOVE IS NO, A DIS	CREPANT	SAMPLE	COLIFT

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SECTION III
CASE NARRATIVE



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-29573

December 8, 2009

John Davis Energy Solutions, LLC 1009 Commerce Park Drive #100 Oak Ridge, TN 37830

#### CASE NARRATIVE Work Order # 09-11114-OR

#### SAMPLE RECEIPT

This work order contains twelve soil samples received 11/25/09. These samples were analyzed for Tritium and Carbon-14.

CLIENT ID	LAB ID	CLIENT ID	<u>LAB ID</u>
ES-SU009-S-15	09-11114-04	ES-B-S-4	09-11114-10
ES-SU009-S-18	09-11114-05	ES-B-S-5	09-11114-11
ES-SU009-S-21	09-11114-06	ES-B-S-6	09-11114-12
ES-B-S-1	09-11114-07	ES-B-S-7	09-11114-13
ES-B-S-2	09-11114-08	ES-B-S-8	09-11114-14
ES-B-S-3	09-11114-09	ES-B-S-9	09-11114-15

#### **ANALYTICAL METHODS**

Tritium was performed using Method LANL ER-210 Modified. Carbon-14 was performed using EPA Method 520.0 Modified.

#### ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

#### **TRITIUM**

Representative aliquots of samples were oxidized using a Harvey Oxidizer. Tritium was captured during oxidization in a selective scintillation cocktail. Samples were then counted by beta liquid scintillation.

Samples demonstrated non-detect equivalent to only slightly positive results for Tritium activity. Results for the Tritium method blank demonstrated non-detect equivalent activity. Results for the Tritium replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Tritium laboratory control sample demonstrated an acceptable percent recovery.

#### ANALYTICAL RESULTS CONTINUED

#### CARBON-14

Aliquots from samples, as received, were high temperature oxidized using a Harvey Oxidizer. Carbon-14 emissions from the oxidization process were selectively extracted into scintillation cocktail. Samples were then counted by beta liquid scintillation using energy specific windows to encompass Carbon-14 energies emitted. Samples were then spiked with a NIST traceable Carbon-14 standard and recounted for efficiency determinations.

Samples demonstrated non-detect equivalent to slightly positive results for Carbon-14 activity. Results for the Carbon-14 method blank demonstrated non-detect equivalent activity. Results for the Carbon-14 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery.

#### CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall Laboratory Manager

Date: 12/8/2009

# SECTION IV ANALYTICAL RESULTS SUMMARY

				Ř	Report To:				_	Work Order Details.	ails		
Ebel	Fline	Eberline Analytical	John Davis	avis				:9as	09-1	09-11114			
ì			Energy	Energy Solutions, LLC	s, LLC			Purchase Order:	313104	40			
Fina	Kep	Final Report of Analysis	1009 C	1009 Commerce Park Drive #100	Park Dr	ive #100		Analysis Category:	ENVIE	ENVIRONMENTAL	TAL		
			Oak Ri	Oak Ridge, TN 3	37830			Sample Matrix:	SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch	Analyte	Method	Result	3	CSU	MDA	Report
09-11114-01	CCS	KNOWN	11/25/09 00:00	11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	3.65E+02	1.02E+01			pCi/q
09-11114-01	SOT	SPIKE	11/25/09 00:00	11/25/2009	9 11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	3.84E+02	5.85E+00	5.88E+00	2.69E+00	pCi/a
09-11114-02	MBL	BLANK	11/25/09 00:00	11/25/2009	9 11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	6.43E-01	1.58E+00	1.58E+00	2.68E+00	pCi/a
09-11114-03	DUP	ES-SU009-S-15	11/24/09 07:00	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-1.22E+00	1.44E+00	1.44E+00	2.53E+00	pCi/a
09-11114-04	8	ES-SU009-S-15	11/24/09 07:00	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-6.38E-01	1.53E+00	1.53E+00	2.66E+00	pCi/a
09-11114-05	· TRG	ES-SU009-S-18	11/24/09 07:10	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-1.62E+00	1.27E+00	1.27E+00	2.26E+00	pCi/q
09-11114-06	TRG	ES-SU009-S-21	11/24/09 07:15	11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	4.11E+00	1.53E+00	1.53E+00	2.45E+00	pCi/a
09-11114-07	TRG	ES-B-S-1	11/24/09 07:20	11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	2.40E+01	1.96E+00	1.96E+00	2.45E+00	pCi/q
09-11114-08	TRG	ES-B-S-2	11/24/09 07:25	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-1.21E+00	1.43E+00	1.43E+00	2.52E+00	pCi/g
09-11114-09	TRG	ES-B-S-3	11/24/09 07:30	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-2.48E+00	1.44E+00	1,44E+00	2.58E+00	pCi/g
09-11114-10	TRG	ES-B-S-4	11/24/09 07:40	11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-2.27E+00	1.31E+00	1.31E+00	2.36E+00	pCi/g
09-11114-11	TRG	ES-B-S-5	11/24/09 07:45	11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-2.34E+00	1.36E+00	1.36E+00	2.44E+00	pCi/g
09-11114-12	TRG	ES-B-S-6	11/24/09 08:00	11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	1.77E+00	1.48E+00	1.48E+00	2.47E+00	pCi/g
09-11114-13	TRG	ES-8-S-7	11/24/09 08:10	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-5.99E-01	1.44E+00	1.44E+00	2.50E+00	pCi/g
09-11114-14	TRG	ES-B-S-8	11/24/09 08:15	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-3.04E+00	1.40E+00	1.40E+00	2.54E+00	pCi/g
09-11114-15	TRG	ES-B-S-9	11/24/09 08:30	11/25/2009 11/25/2009	11/25/2009	09-11114	Carbon-14	EPA 520.0 Modified	-1.21E+00	1.44E+00	1.44E+00	2.52E+00	pCi/g
09-11114-01	rcs	KNOWN	11/25/09 00:00	11/25/2009 11/25/2009	11/25/2009	09-11114	Triffum	I ANI FR-210 Modified	3 55E+02	1 28E+01			J. C.
09-11114-01	SOT	SPIKE	11/25/09 00:00	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	3.45F+02	9 55F+00	3 94F+01	5 19F±00	מיילק
09-11114-02	MBL	BLANK	11/25/09 00:00	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	3.55E+00	2.98E+00	3.01E+00	4.95F+00	DCi/o
09-11114-03	DUP	ES-SU009-S-15	11/24/09 07:00	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	5.24E+00	2.99E+00	3.05E+00	4.86E+00	DCI/a
09-11114-04	8	ES-SU009-S-15	11/24/09 07:00	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	9.51E+00	3.40E+00	3.56E+00	5.30E+00	pCi/g
09-11114-05	TRG	ES-SU009-S-18	11/24/09 07:10	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.29E+01	3.06E+00	3.38E+00	4.50E+00	pCi/g
09-11114-06	TRG	ES-SU009-S-21	11/24/09 07:15	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.51E+01	3.24E+00	3.65E+00	4.68E+00	pCi/g
09-11114-07	TRG	ES-B-S-1	11/24/09 07:20	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.24E+01	3.30E+00	3.57E+00	4.94E+00	pCi/g
09-11114-08	TRG	ES-B-S-2	11/24/09 07:25	11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.12E+02	5.92E+00	1.38E+01	5.12E+00	pCi/g
09-11114-09	TRG	ES-B-S-3	11/24/09 07:30	11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	2.24E+01	3.78E+00	4.52E+00	5.20E+00	pCi/g
09-11114-10	TRG	ES-B-S-4	11/24/09 07:40	11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	4.99E+00	2.85E+00	2.91E+00	4.63E+00	pCi/g
09-11114-11	TRG	ES-B-S-5	11/24/09 07:45	11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.24E+01	3.31E+00	3.58E+00	4.95E+00	pCi/g
09-11114-12	TRG	ES-B-S-6	11/24/09 08:00		11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.10E+01	3.34E+00	3,56E+00	5.10E+00	pCi/g
09-11114-13	TRG	ES-B-S-7	11/24/09 08:10	11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.07E+01	3.27E+00	3.48E+00	4.99E+00	pCi/g
09-11114-14	TRG	ES-B-S-8	11/24/09 08:15	11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	7.35E+00	3.22E+00	3.32E+00	5.12E+00	pCi/g
09-11114-15	- RG	ES-B-S-9	11/24/09 08:30	11/25/2009 11/25/2009	11/25/2009	09-11114	Tritium	LANL ER-210 Modified	1.29E+01	3.42E+00	3.71F+00	5 12F+00	D) C

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original



SECTION V
ANALYTICAL STANDARD



## CERTIFICATE OF CALIBRATIO BETA STANDARD SOLUTION

GRAGE REVIEWE

Radionuclide

H-3

Customer:

THERMO NUTECH

Half Life:

 $12.35 \pm 0.1$  years

P.O.No.:

5108

Catalog No.: Source No.: 7003 660-25 Reference Date:

15 Apr 99

Contained Radioactivity:

99 12:00 PST. 99.61 μCi (3686 kBq)

Description of Solution

a. Mass of solution:

4.91974 grams in 5 mL flame sealed ampoule

b. Chemical form:

c. Carrier content:

Tritiated water
Not applicable

d. Density:

0.9982

gram/ml @ 20°C.

Radioimpurities

None detected

Radioactive Daughters

None

Radionuclide Concentration

20.25 µCi/gram

#### Method of Calibration

This source was prepared from a weighed aliquot of solution whose concentration in  $\mu$ Ci/gram was determined by a liquid scintillation counter.

#### Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:

+3.0%

b. Random uncertainty in assay:

+1.9%

c. Random uncertainty in weighing(s):

+0.0%

d. Total uncertainty at the 99% confidence level:

+3.6%

#### **NIST Traceability**

This calibration is implicitly traceable to the National Institute of Standards and Technology.

#### Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

#### Notes

 IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)

I S O T O P F P R O D U C T S LABORATORIES

ISOTOPE PRODUCTS LABORATORIES

1800 N. KEYSTONE STREET BURBANK, CALIFORNIA 91504

818 · 843 · 7000 Fax 818 · 843 · 6168

QUALITY CONTROL

2 A by 99 Date Signed

### **Eberline Services**



#### **QUALITY CONTROL PROGRAM** QCP-009

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

Eberline Services - OAK RIDGE LABORATORY

RADIOACTIVE REFERENCE SOLUTIONS PRIMARY DILUTION (RECERTIFICATION)	
QCP 009-1	
	CURRENT DATE 01/05/09
SOLUTION REFERENCE # IPL 660-25	SOLUTION # H-5
Principal Radionuclide Half Life, Years  1.235E+01	Half Life, Days 4.511E+03
Radionuclide 3H  Certified Activity 9.961E+01 μCi  Certified Concentration μCi per gram	Reference Date 4/15/1999 0:00
Ampoule /Solution Gross	Weight, Grams
Empty Ampoule	Weight, Grams
Solution Net	Weight, Grams
Total Activity in Ampoule 99.6100	JμCi
Chemical Composition of Standard Solution	
<sup>3</sup> H <sub>2</sub> O in water	i .
1120 111 110.01	
Dilution Instructions: Dilution Solution Instructions: Dilute to a volume of 1000.00 milliliters	Ivent Used Water
Certified Total Activity of 99.6100 µCi Which Equals	2.211E+08 dpm
And after dilution the activity of this solution is 2.211E+05	dpm/ml
Tthis standard was recertified by measurement liste	s activity concentration is based on the original reference date ed above. All activities are corrected to the date and time of lysis by the laboratory data processing software.
	Expiration Date: 01/05/10
Diluted By	Date: 01/05/09
Verified & Approved By	Date: 1/16/09
QC Approval Munt plane	Date: 1/16/09

Eberline Services



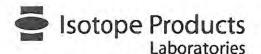
#### QUALITY CONTROL PROGRAM

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

## **Eberline Services - OAK RIDGE LABORATORY**

RAD	DIOACTIVE REFERENCE STAP SECONDARY DILUTION (RECE		
Solution	QCP-009-1-A Reference #[IPL 660-25	Date Solution #	1/5/09 H-5a
Principal Radionuclide अभ	Half Life, Years 1.235E+01	Ĺ	laif Life, Days 4.511E+03
Radionuclide of Interest Parent Solution Conc.	<sup>3</sup> H 2.21E+05 dpm/ml	Reference Date	4/15/1999 0:00
Chemical Com <sup>3</sup> H <sub>2</sub> O in water	position of Standard Solution		
Dilution Instructions:	Dilution SECONDARY VOLUMETRIC I		Vater
Vol. Parent Solution: Total Activity: Final Volume:	65.0000 ml	Activity Concentration:	1.4372E+04]dpm/ml
NOTES:		This activity concentra original reference date activities are corrected analysis by the laborate software.	listed above. All to the date and time of
		Expiration Date:	01/05/10
Recertified By: _ Verified & Approved By: _	C. Cear	Date: _	01/05/09
QC Approval:	Must alere	Date:	1116109



24937 Avenue Tibbitts Valencia, California 91355

Tel 661 · 309 · 1010

An Eckert & Ziegler Company

Fax 661-257-8303

### CERTIFICATE OF CALIBRATION BETA STANDARD SOLUTION

Radionuclide: C-14

Catalog No.:

Source No.:

Half-life:

7014

841-40

5730 ± 40 years

Customer:

**EBERLINE SERVICES** 

P.O. No.:

00009439

Reference Date:

1-Nov-01 12:00 PST

Contained Radioactivity: 72.54

μCi 2684 kBq

Physical Description:

A. Mass of solution:

5.10940 g in 5 mL flame-sealed ampoule

B. Chemical form:

Sodium Benzoate in 0.1M NaOH

C. Carrier content:

D. Density:

1.002 g/mL @ 20°C.

Radioimpurities:

None detected

Radionuclide Concentration:

14.20

None

μCi/g,

525.4

kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/q was determined using a liquid scintillation counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty:

2.0 %

B. Type B (systematic) uncertainty:

2.0 %

C. Uncertainty in aliquot weighing:

± 0.0 %

D. Total uncertainty at the 99% confidence level:

± 2.8 %

#### Notes:

- See reverse side for leak test(s) performed on this source.

- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from NCRP Report No. 58, 1985.
- This solution has a working life of 5 years.

Quality Control Date Signed

IPL Ref. No.:

841-40

Medical Imaging Laboratory

24937 Avenue Tibbltts Valencia, California 91355

**Industrial Gauging Laboratory** 

1800 North Keystone Street Burbank, California 91504

- ISO 9001 CERTIFIED



#### **QUALITY CONTROL PROGRAM**

MP-009

Rev.8; 1/10/03

Title: Radioactive Reference Standards Solutions & Records

	PRIMARY DILUTIO	DAK RIDGE LABORATO ERENCE SOLUTIONS ON REVERIFICATION P 009	DRY
SOLUTION REFERE	NCE # IPL 841-40	CURRENT DATE SOLUTION #	12/30/2008 0:00 C-3
Principal Radionuclide	Half Life, Years		Half Life, Days
<sup>14</sup> Carbon	5.730E+03		2.093E+06
	rbon 4E+01 μCi μCi per gram	Reference Date	11/1/2001 0:00
Amp	oule /Solution Gross Empty Ampoule Solution Net	Weight, Grams Weight, Grams	
Tota		Weight, Grams .5400 μCi	
Sodium Benzoate in  Dilution Instructions:  Dilute to a volu	Dilution Dil	ters	0.1M NaOH  dpm at the date listed above
	ity of this solution is 1.610	This active reference to the date	vity concentration is based on the original edate listed above. All activities are corrected to and time of analysis by the laboratory dataing software.
		Expiration Date:	December 30, 2009
Recertified By Verified & Approved By	Siare	Date:	12/30/2008 0:00
QC Approval	Multalan	Date:	1/16/09



## QUALITY CONTROL PROGRAM QCP-009

Rev.8; 1/10/03 Title: Radioactive Reference Standards Solutions & Records

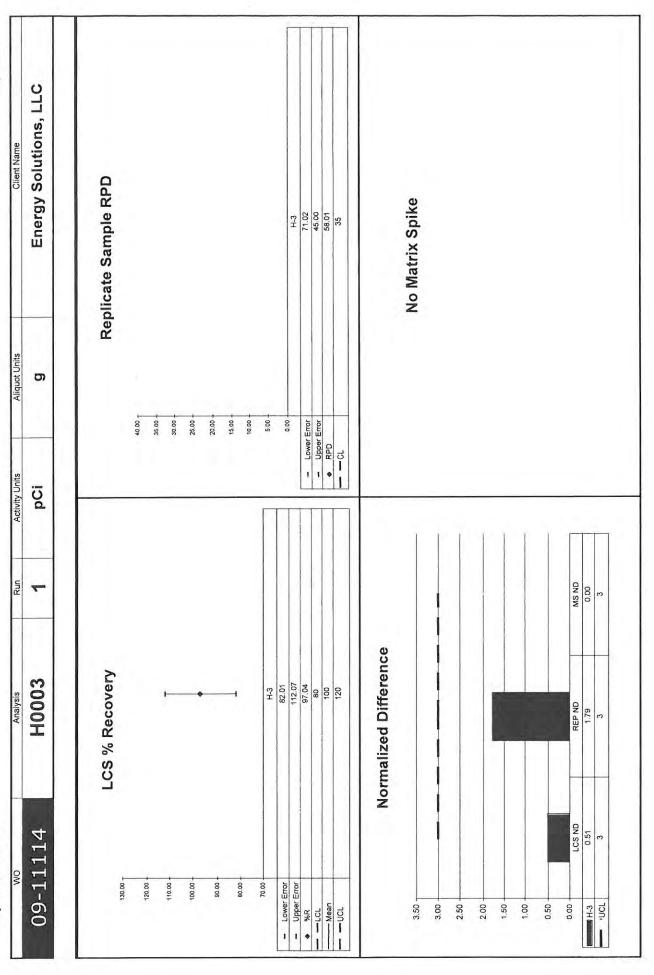
#### **EBERLINE SERVICES - OAK RIDGE LABORATORY** RADIOACTIVE REFERENCE STANDARD SOLUTIONS

	SECONDARY DILUTION REVE	RIFICATION		
	MP-009-1-A	Date	12/30/2008 0:00	
Solution Refe	rence # IPL 841-40	Solution #	C-3a	
Principal Radionuclide	Half Life, Years		lalf Life, Days	
<sup>14</sup> Carbon	5.730E+03		2.093E+06	
	rbon E+05 dpm/ml	Reference Date	11/1/2001 0:00	
Chemical Compositi Sodium Benzoate in 0	on of Standard Solution ).1M NaOH			
Dilution Instructions:	Dilution	Solvent Used	0.1 M NaOH	
Vol. Parent Solution: 2 Total Activity: 3.220	0.0000 ml 08E+06 dpm Final A	OILUTION	3.2208E+03 dpm/ml	
NOTES:	reference corre	activity concentration is ence date listed above. ected to the date and tin atory data processing s	All activities are ne of analysis by the	
		Expiration Date:	December 30, 2009	
Recertified By	Jy C	Date: _	12/30/2008 0:00	
Verified & Approved By Cc	Jearen -	Date: _	1116/09	
QC Approval	hul alena	Date: _	1/16/09	

# SECTION VI QUALITY CONTROL SAMPLE RESULTS SUMMARY

wo		Analysis		Run	Activity Units	/ Units	Aliquot Units	Units			Client Name		
09-11114		H0003		-	pCi	ö	5			Energy	Energy Solutions, LLC	ns, LLC	
				Labor	Laboratory Control Sample	control ?	Sample						
Analyte	Normalized Difference	LCS	CSU	LCS Expected	Uncert. Expected	Known	Known Error	Result	nso	Standard ID	Standard ACT (dpm)	Standard	Standard Added (g)
H3	0.51	97.04%	11.43%	100.00%	3.60%	3.55E+02	1.28E+01	3.45E+02	3.94E+01	H-5a	7.90E+03	3.60E+00	9.99E-02
					Matri	Matrix Spike							
Алајуте	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)
	Rep	Replicate Sample	ample						QC	Summary	ary		
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	TCS ND	MS % R	MS ND	Rep RPD	Rep ND
н.3	1.79	58.01	9.51E+00	3.56E+00	5.24E+00	3.05E+00	76.0	OK Y	OK			NN	OK.

Printed: 11/27/2009 11:27 AM Page 2 of 2



WO		Analysis		Run	Activity Units	/ Units	Aliquot Units	Units			Client Name		
09-11114		C0014		-	bd	pCi	ס			Energy	Energy Solutions, LLC	ns, LLC	
				Labo	Laboratory Control Sample	ontrol :	Sample						
Analyte	Normalized Difference	LCS	CSU	LCS	Uncert, Expected	Known	Known Error	Result	nso	Standard ID	Standard ACT (dpm)	Standard	Standard Added (g)
C-14	4.31	105.36%	1.53%	100.00%	2.80%	3.65E+02	1.02E+01	3.84E+02	5.88E+00	C-3a	3.09E+03	2.80E+00	2.62E-01
					Matrix	x Spike							
Апаїуте	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)
	Rep	Replicate S	Sample						QC	Summary	ary		
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	TCS ND	MS % R	MS ND	Rep RPD	Rep ND
C-14	0.54	62.22	-6.38E-01	1.53E+00	-1.22E+00	1.44E+00	1.05	Š	NI			N	ş

Printed: 11/27/2009 11:26 AM Page 2 of 2

09-11114	C00014	•			
	1000	1	pCi	D	Energy Solutions, LLC
			-		
T 00.081	LCS % Recovery			Repl	Replicate Sample RPD
120.00			4 6	40.00	
100.001	<b>I</b> → <b>→</b> -I			30.00 +	
90.00			N	20.00	
80.00				15.00 +	
70.00	0.44			100.00	
Lower Error	101.03				
Upper Error	109,69			0.00	C-14
<ul><li>%R</li></ul>	105.36		I Lower Error	iror	12.29
ICI	80		I Upper	rror	112.14
Mean	100		◆ RPD		62.22
100r	120		15 I		36
	Normalized Difference			z	No Matrix Spike
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3.50			11		
3.00			_		
2.00					
1.50			1		
0.50					
0.00	REP ND	MS ND			
,	0.54	0.00			
100	m	m			

# SECTION VII LABORATORY TECHNICIAN'S NOTES

H-3 NOTES

Printed: 11/25/2009 11:42 AM Page 1 of 1



**Work Order Analysis Notes** 

11-25-09 Jackella

### Oak Ridge Laboratory

601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com

Internal Work Order	09-11114
Analysis Code	H0003
Run Number	1

#	Date	Dept	User	Notes
1	11/25/09 11:42	PREP	JPACHELLA	Samples were aliquoted. Spikes and blanks were prepared. Samples were processed through Harvey Oxidizer. Samples were submitted to count room.

031

Printed: 11/25/2009 11:35 AM Page 1 of 1

		Inter	nal Work Order	
	ERLINE	09	-11114	
	SERVICES	Analysis	Code	Run
Reag	ents Used in an Analysis	H00	03	1
Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
008490P	Ultima Gold XR	Reagent Grade	JPACHELLA	11/25/2009

1 .46	Date		1 + o to	Errical. Client Energy Sol	b 3100 (			81
		Sumple #	1 2	Clent	Loud The	Ot The	Analysis	Tem
1	Inpostal (	911074ALF369,1213	12	EnergySol	2614	4hrs	H3	ICB
	11/24/10				1010	Ghrs	76T Act.	icis
	11/2010	(8,24-1) APITIES	14	BAC	1015	Chrs	Toga	ics
	100	DAILLAH (1-12'0)	1	Enersy Sil	1336	8 hrs	H3	1003
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			Service Control					833

C-14 NOTES



## Oak Ridge Laboratory

601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com

Internal Work Order	09-11114	
Analysis Code	C0014	
Run Number	1	

Da	te De	ept User	Notes
1 11/25/09	11:42 PR	EP JPACHELLA	Samples were aliquoted. Spikes and blanks were prepared. Samples were processed through Harvey Oxidizer. Samples were submitted to count room.
	. J. <u> </u>	0/20	la e le
1 1	25A)	Hu	Kella

Printed: 11/25/2009 11:39 AM Page 1 of 1

-2		Inter	nal Work Order	
	BERLINE	09	-11114	
	SERVICES	Analysis	Code	Run
	ents Used in an Analysis	C00	14	1
Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
008424P	Harvey carbon14 cocktail	Reagent Grade	JPACHELLA	11/25/2009

1	4	1	3	Three	inh 3100	$^{\circ}$		
34.6)	Parte	Sample #		L chent	Kreed The			27
und relexact	1/17/19	591102A(1-4,6,B)		7 BJC	-	et Tane	Anabyer	Per(
	11-18-69	10911062A (1-35BR	9 -		1538	Chrs	Tc99	193
in the second	11/18/09	1911024A (1-6)	aL	11. 4.		3hrs	CIU	my
	1/18/19	69 11063 Nise	10	- B3C		Cohrs	Puzul	ICB.
	1/18/29	13,5,6) ASDON PO		BJC	1249	3.hrs	Ciy	(CB
11 h 1 more	11/11/29	091106317 (13,G,B	13	155C	1705	lohrs	H3	ICB
	119/09	59 10 MO A (-4, A, A	111	BSC	1740	lohrs	H3	193
_ :	119/09/	(A.M.) A82011 PC	13	ES	1439	Thehrs	Nivs	193
	1719-64	OTTOGA CHASERS	YM	BJC	1019	5hrs	7099	1CB
1)	12369	09110884(1-4,12,17,18	11	Energy Sol		3 hrs	614	ng
11	CODY D	MILOSO DAPROUPE	13		1408	3 Yehrs	H3	103
u)	23/29 of	CH1090A (1518)	et	EnergySol	1617	3 hrs	#3	KB
	12454 B	911071A( HY.D)	113	Energy Sol ES	1619	3 hrs	#3 Tc99	ICB
- $W$	leyby de	211074A(1-4B)	Ko	BJC	1207	Shrs		143
rule the	25/09 00	911114A(1-166,R	Va	6.00 K)	1007	Thrs	TC99	1CB
		1476	200	CURAJASOI	1327	8 behrs	Cire	Vers !
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SECTION VIII
ANALYTICAL DATA (TRITIUM)

Printed: 11/25/2009 11:35 AM Page 1 of 3

09-11114 H0003 Run 1

Eberline Services Oak Ridge Laboratory Analysis Sheet

Work Order         Q9-11114         Interests fraction         Lose         Client ID         Client ID         Client ID         Client ID         Client ID         LCS         Client ID         LCS         LCS         LCS         TIZE/00 00:00           Date Recalved         11/25/2009         03         NBL         ES-SU009S-15         44         11/25/00 00:00           Date Recalved         11/30/2009         04         DO         ES-SU009S-15         44         11/24/09 07:00           Lab Dasaline         11/30/2009         04         DO         ES-SU009S-16         44         11/24/09 07:00           Lab Dasaline         11/30/2009         04         DO         ES-SU009S-16         44         11/24/09 07:00           Report Lavel         4         07         TRG         ES-SU009S-21         36         11/24/09 07:00           Activity Units         pCi         TRG         ES-B-S-1         45         11/24/09 07:20           Adjust Units         pCi         TRG         ES-B-S-2         56         11/24/09 07:20           Adjust Units         pCi         TRG         ES-B-S-2         56         11/24/09 07:20           Mativerser         So         10         TRG         ES-								
H0003         01         LCS         LCS           1         MBL         BLANK         44           11/25/2009         03         DuP         ES-SU009-S-15         44           11/30/2009         04         DO         ES-SU009-S-16         44           Energy Solutions, LLC         05         TRG         ES-SU009-S-18         49           ENV         06         TRG         ES-SU009-S-21         36           PCI         07         TRG         ES-B-S-1         43           SO         10         TRG         ES-B-S-2         56           LANL ER-210 Modified         11         TRG         ES-B-S-3         49           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-6         40           13         TRG         ES-B-S-6         40           14         TRG         ES-B-S-9         53           14         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42           16         TRG         ES-B-S-9         42           17         TRG         ES-B-S-9         42	Work Order	09-11114	Internal Fraction	Sample Desc	Client ID	Login	Sample Date	Sample Aliquot
1         02         MBL         BLANK         44           11/25/2009         03         DUP         ES-SU009-S-15         44           11/30/2009         04         DO         ES-SU009-S-15         44           Energy Solutions, LLC         05         TRG         ES-SU009-S-18         49           ENV         06         TRG         ES-B-S-1         49           PCI         07         TRG         ES-B-S-1         43           PCI         08         TRG         ES-B-S-2         56           SO         10         TRG         ES-B-S-3         49           SO         10         TRG         ES-B-S-3         49           Beta LSC         12         TRG         ES-B-S-5         40           Beta LSC         13         TRG         ES-B-S-6         40           14         TRG         ES-B-S-7         31           15         TRG         ES-B-S-8         42           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42	Analysis Code	H0003	2	rcs	SOT		11/25/09 00:00	1.0000E+00
11/25/2009         03         DUP         ES-SU009-S-15         44           11/30/2009         04         DO         ES-SU009-S-15         44           Energy Solutions, LLC         05         TRG         ES-SU009-S-18         49           ENV         06         TRG         ES-SU009-S-21         36           A         07         TRG         ES-SU009-S-21         36           PCI         08         TRG         ES-B-S-1         43           Boti         09         TRG         ES-B-S-2         56           NO         TRG         ES-B-S-3         49           Reta LSC         11         TRG         ES-B-S-6         40           Beta LSC         12         TRG         ES-B-S-6         40           14         TRG         ES-B-S-6         40           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42	Run	<b>-</b>	02	MBL	BLANK		11/25/09 00:00	1.0000E+00
11/30/2009         04         DO         ES-SU009-S-15         44           Energy Solutions, LLC         05         TRG         ES-SU009-S-21         36           ENV         06         TRG         ES-B-S-1         49           4         07         TRG         ES-B-S-1         49           PCI         08         TRG         ES-B-S-1         49           SO         10         TRG         ES-B-S-3         49           LANL ER-210 Modified         11         TRG         ES-B-S-4         45           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-6         40           13         TRG         ES-B-S-6         40           14         TRG         ES-B-S-7         31           15         TRG         ES-B-S-8         53           15         TRG         ES-B-S-9         42	Date Received	11/25/2009	03	DUP	ES-SU009-S-15	44	11/24/09 07:00	1.0675E+00
Energy Solutions, LLC         05         TRG         ES-SU009-S-18         49           A         4         07         TRG         ES-B-S-1         36           PCI         08         TRG         ES-B-S-2         56           SO         10         TRG         ES-B-S-3         49           SO         10         TRG         ES-B-S-3         49           LANL ER-210 Modified         11         TRG         ES-B-S-5         41           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-6         40           14         TRG         ES-B-S-7         31           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42	Lab Deadline	11/30/2009	90	DO	ES-SU009-S-15	44	11/24/09 07:00	1.0253E+00
ENV         06         TRG         ES-S-U009-S-21         36           4         07         TRG         ES-B-S-1         43           pCi         08         TRG         ES-B-S-2         56           g         09         TRG         ES-B-S-3         49           so         10         TRG         ES-B-S-4         45           LANL ER-210 Modified         11         TRG         ES-B-S-6         40           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-6         40           14         TRG         ES-B-S-8         53           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42	Client	Energy Solutions, LLC	05	TRG	ES-SU009-S-18	49	11/24/09 07:10	1.1768E+00
4         07         TRG         ES-B-S-1         43           pci         08         TRG         ES-B-S-2         56           g         09         TRG         ES-B-S-3         49           so         10         TRG         ES-B-S-4         45           LANL ER-Z10 Modified         11         TRG         ES-B-S-5         40           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-7         31           14         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42           16         TRG         ES-B-S-9         42           16         TRG         ES-B-S-9         42	Project	ENV	90	TRG	ES-SU009-S-21	36	11/24/09 07:15	1.0972E+00
g         TRG         ES-B-S-2         56           so         TRG         ES-B-S-4         49           LANL ER.210 Modified         11         TRG         ES-B-S-5         41           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-7         31           14         TRG         ES-B-S-8         53           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42	Report Level	4	20	TRG	ES-B-S-1	43	11/24/09 07:20	1.1166E+00
g         109         TRG         ES-B-S-3         49           SO         10         TRG         ES-B-S-4         45           LANL ER-210 Modified         11         TRG         ES-B-S-5         41           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-7         31           14         TRG         ES-B-S-8         53           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42           16         TRG         ES-B-S-9         42           16         TRG         ES-B-S-9         42	Activity Units	pCi	08	TRG	ES-B-S-2	56	11/24/09 07:25	1.0587E+00
SO       10       TRG       ES-B-S-4       45         LANL ER-210 Modified       11       TRG       ES-B-S-5       41         Beta LSC       12       TRG       ES-B-S-6       40         13       TRG       ES-B-S-7       31         14       TRG       ES-B-S-8       53         15       TRG       ES-B-S-9       42         15       TRG       ES-B-S-9       42         15       TRG       ES-B-S-9       42         15       TRG       ES-B-S-9       42	Aliquot Units	D	60	TRG	ES-B-S-3	49	11/24/09 07:30	1.0358E+00
LANL ER-210 Modified         11         TRG         ES-B-S-5         41           Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-7         31           14         TRG         ES-B-S-8         53           15         TRG         ES-B-S-9         42           15         TRG         ES-B-S-9         42	Matrix	os	10	TRG	ES-B-S-4	45	11/24/09 07:40	1.1454E+00
Beta LSC         12         TRG         ES-B-S-6         40           13         TRG         ES-B-S-7         31           14         TRG         ES-B-S-8         53           15         TRG         ES-B-S-9         42           16         TRG         ES-B-S-9         42           17         TRG         ES-B-S-9         42           18         19         10         10           19         10         10         10           10         10         10         10	Method	LANL ER-210 Modified	11	TRG	ES-B-S-5	41	11/24/09 07:45	1.0930E+00
13       TRG       ES-B-S-7       31         14       TRG       ES-B-S-8       53         15       TRG       ES-B-S-9       42         16       TRG       ES-B-S-9       42         17       TRG       ES-B-S-9       42         18       19       10       10         19       10       10       10         10       10       10       10         10       10       10       10         10       10       10       10         10       10       10       10         10       10       10       10         10       10       10       10         10       10       10       10         10       10       10       10       10         10       10       10       10       10       10         11       10       10       10       10       10       10         11       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       1	Instrument Type	Beta LSC	12	TRG	ES-B-S-6	40	11/24/09 08:00	1.0774E+00
14       TRG       ES-B-S-8       53         15       TRG       ES-B-S-9       42         16       17       18       18         17       18       18       18         18       19       19       19         19       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         10       19       19       19         11       19       19       19         12       19       19       19       19         12       19       19       19	Radiometric Tracer		13	TRG	ES-B-S-7	31	11/24/09 08:10	1.0763E+00
15 TRG ES-B-S-9 42	Radiometric Sol#		14	TRG	ES-B-S-8	53	11/24/09 08:15	1.0620E+00
Carrier Conc (mg/ml)	Tracer Act (dpm/g)		15	TRG	ES-B-S-9	42	11/24/09 08:30	1.0713E+00
Carrier Conc (mg/ml)	Carrier							
	Carrier Conc (mg/ml)							

\*SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. \*\* Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Printed: 11/25/2009 11:35 AM Page 2 of 3

09-11114 H0003 Run 1

Eberline Services Oak Ridge Laboratory Analysis Sheet

SAF 2*				ĥ									T					
SAF 1*																		ļ
Mean % Rec																		
Grav % Rec																		
Grav Filter Net (g)																		
Grav Filter Final (g)																		
Grav Filter Tare (g)																		
Grav Carrier Added (ml)																		
Radiometric % Rec	00'0	00.00	00.00	00.00	00.00	00.00	00.00	0.00	00.00	00.00	0.00	00.00	00.00	00.00	00.00			
Radiometric Tracer (pCi)																		
Tracer Total ACT (dpm)																		
Tracer Aliquot (g)																		
Sample Desc	CS	MBL	DUP	DO	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG			
Internal Fraction	10	02	03	04	05	90	07	80	60	10	11	12	13	14	15			

\*SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. \*\* Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Printed: 11/25/2009 11:35 AM Page 3 of 3

09-11114 H0003 Run 1

Eberline Services Oak Ridge Laboratory Analysis Sheet

Sep t1 By																		
Sep t1 Date/Time																		
Sep t0 By																		
Sep t0 Date/Time																		
Prep By	JPACHELLA																	
Prep Date	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27	11/25/09 11:27			
Rough Prep By																		
Rough Prep Date																		
Sample Desc	rcs	MBL	DUP	DO	TRG			1										
Internal Fraction	10	02	03	04	90	90	20	80	60	10	1	12	13	14	15			

\* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. \*\* Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Printed: 11/27/2009 11:27 AM Page 1 of 3

Preliminary Data Report & Analytical Calculations Work Order: 09-11114-H0003-1

Blank Flag		ò																
MDA	Š	Š	Š	Š	ş	ş	ş	ş	ş	ş	š	ğ	8 K	ş	ě			
RPD		2.	INV															
LCS	ě																	
LCS %R	97.04																	
Known	3.55E+02																	
MDA	5.19E+00	4.95E+00	4.86E+00	5.30E+00	4.50E+00	4.68E+00	4.94E+00	5.12E+00	5.20E+00	4.63E+00	4.95E+00	5.10E+00	4.99E+00	5.12E+00	5.12E+00			
Error Estimate	9.55E+00	2.98E+00	2.99E+00	3.40E+00	3.06E+00	3.24E+00	3.30E+00	5.92E+00	3.78E+00	2.85E+00	3.31E+00	3.34E+00	3.27E+00	3.22E+00	3.42E+00			
Results	3.45E+02	3.55E+00	5.24E+00	9.51E+00	1,29E+01	1.51E+01	1.24E+01	1.12E+02	2.24E+01	4.99E+00	1.24E+01	1.10E+01	1.07E+01	7.35E+00	1.29E+01			
Activity Units	pCI/g	pCI/g	pCI/g	pCI/g	pCI/g	pCI/g	pCI/g	pCi/g	bCi/g	pCI/g	pCI/g	pCl/g	pCI/g	pCI/g	pCI/g			
Cilent Identification	FCS	BLANK	ES-SU009-S-15	ES-SU009-S-15	ES-SU009-S-18	ES-SU009-S-21	ES-B-S-1	ES-B-S-2	ES-B-S-3	ES-B-S-4	ES-B-S-5	ES-B-S-6	ES-B-S-7	ES-B-S-8	ES-B-S-9			
Sample Desc	rcs	MBL	ana	00	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG			
Nucide	H.3	E,	H-3	H-3	H-3	H-3	H-3	H-3	H-3	н-3	H-3	H-3	H.3	H-3	H-3			
Fraction	01	02	03	04	05	90	20	80	60	10	+	12	13	14	15			

9,10	L	H0003	<b>ÞIIII-60</b>	Energy Solutions, LLC
	Run	Analysis Code	Eberline Services Work Order	Client

Printed: 11/27/2009 11:27 AM Page 2 of 3

Preliminary Data Report & Analytical Calculations Work Order: 09-11114-H0003-1

Fraction	01	02	03	04	05	90	07	80	60	10	11	12	13	14	15				
Nucilde	H-3	H S	F.	H-3	H-3	H S	H-3	H-3	H-3	H.S.	H-3	H-3	? H	H-3	F. H.				
Sample	S	MBL	and	8	TRG														
Sample Date	11/25/09 00:00	11/25/09 00:00	11/24/09 07:00	11/24/09 07:00	11/24/09 07:10	11/24/09 07:15	11/24/09 07:20	11/24/09 07:25	11/24/09 07:30	11/24/09 07:40	11/24/09 07:45	11/24/09 08:00	11/24/09 08:10	11/24/09 08:15	11/24/09 08:30				
Sample Allquot	1.00E+00	1.00E+00	1.07E+00	1.03E+00	1.18E+00	1.10E+00	1.12E+00	1.06E+00	1.04E+00	1.15E+00	1.09E+00	1.08E+00	1.08E+00	1.06E+00	1.07E+00				
Radiometric % Rec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Grav % Rec	0.00	0.00	0.00	0.00	0.00	00.00	0.00	0.00	0.00	0.00	0.00	00.00	0.00	0.00	0.00				
Mean % Rec	00.00	00.00	0.00	0.00	0.00	00.00	00.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
SAF																			
Sep t0 Date/Time							- Contract												
Sep t1 Date/Time		141																	
			1	1	1	1			1	1		All I		1	1		4	1	

9,3	L	H0003	<b>PIIII-60</b>	Energy Solutions, LLC
	นทษ	Analysis Code	Eberline Services Work Order	Client

# Preliminary Data Report & Analytical Calculations Work Order: 09-11114-H0003-1

Lab Fraction	Nuclide	Sample	Counting Date/Time	Halflife (days)	Detect	Carrier	Count	Counts	Bkg CPM	E#
10	H-3	SOT	11/25/09 13:37	4485.27	3100A	•	30	5850	Ļ	10 0.241709437
02	H-3	MBL	11/25/09 14:08	4485.27	3100A	2	30	360	-	10 0.253509424
03	H-3	DUP	11/25/09 14:39	4485.27	3100A	က	30	390	-	10 0.241837824
04	F. 7	8	11/25/09 15:10	4485.27	3100A	4	30	450	-	10 0.230948222
90	H-3	TRG	11/25/09 15:41	4485.27	3100A	ĸ	30	540	-	10 0.237052468
90	H-3	TRG	11/25/09 16:11	4485.27	3100A	9	30	670	-	10 0.244335547
20	T P	TRG	11/25/09 16:42	4485.27	3100A	7	30	510	-	10 0.227516771
80	e, T	TRG	11/25/09 17:13	4485.27	3100A	80	30	2130	-	10 0.23159016
60	H.3	TRG	11/25/09 17:44	4485.27	3100A	o	30	099		10 0.232967408
10	H-3	TRG	11/25/09 18:14	4485.27	3100A	0	30	390	-	10 0.236503903
11	H-3	TRG	11/25/09 18:45	4485.27	3100A	7	99	510	-	10 0.231753562
12	H-3	TRG	11/25/09 19:16	4485.27	3100A	12	30	480	-	10 0.228263754
13	H-3	TRG	11/25/09 19:47	4485.27	3100A	13	30	480	-	10 0.233749406
14	H-3	TRG	11/25/09 20:17	4485.27	3100A	4	30	420	-	10 0.230913207
15	H-3	TRG	11/25/09 20:48	4485.27	3100A	15	30	510		10 0.228590558

0,1	L	H0003	<b>ÞIIII-60</b>	Energy Solutions, LLC
	Run	Analysis Code	Eberline Services Work Order	Client

09-11114-H0003-1 (pCi/g) in SO Tracer ID:

Count Room Report Client: Energy Solutions, LLC

Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
SOT	11/25/09 00:00	1.0000				00.00		
BLANK	11/25/09 00:00	1.0000				00.00		
ES-SU009-S-15	11/24/09 07:00	1.0675				0.00		
ES-SU009-S-15	11/24/09 07:00	1.0253				0.00		
ES-SU009-S-18	11/24/09 07:10	1.1768				0.00		
ES-SU009-S-21	11/24/09 07:15	1.0972				0.00		
ES-B-S-1	11/24/09 07:20	1.1166				0.00		
ES-B-S-2	11/24/09 07:25	1.0587				0.00		
ES-B-S-3	11/24/09 07:30	1.0358				00.00		
ES-B-S-4	11/24/09 07:40	1.1454				0.00		
ES-B-S-5	11/24/09 07:45	1.0930				0.00		
ES-B-S-6	11/24/09 08:00	1.0774				0.00		
ES-B-S-7	11/24/09 08:10	1.0763				0.00		
ES-B-S-8	11/24/09 08:15	1.0620				00.00		
ES-B-S-9	11/24/09 08:30	1.0713				0.00		

Eberline Services Oak Ridge Laboratory

0.000 Error Estimate Witness Initials MSD 0.00 Added pCi Matrix Spike 0.000 Error Estimate CS CSD 0.00 Known Balance Printer Tapes 0.000 Error Estimate 0.00 Added **JPACHELLA** Technician 12.790 Error Estimate 355.29 Known Tracer pCi Volume Used (g) 11/25/2009 11:27 MSD CSD Volume Used (g) Approx Addition Volume Used (g) MS Analysis Code H0003 0.0999 Volume Used (g) Volume Used (g) SS 0.360 Approx Addition Solution Date Run 11/25/2009 **Tracers** Solution Date Activity dpm/g LCS & Matrix Spikes 7895.237 Activity dpm/g Internal Work Order # /oS 09-11114 Isotope # Jos H-5a Isotope fraction H-3

646

## Aliquot Worksheet

Eberline Analytical Oak Ridge Laboratory

Dilution Data	Dilution Data
Dilution Data         Aliquot Data         MS Aliquot Data         H-3 Solids Colids	Dilution Data         Aliquot Data         MS Aliquot Data         H-3 Solids Colids Colids (ml)           Dil Factor         Ratio         Aliquot         Net Equiv         Aliquot         Net Equiv         (ml)           1,0000E+00         1,0000E+00         1,0000E+00         1,0000E+00         1,0000E+00         1,00000E+00         1,00000E+00         1,00000E+00         1,00000E+00         1,00000E+00         1,00000E+00         1,00000E+00         1,000000E+00         1,000000E+00         1,000000E+00         1,000000E+00         1,0000000         1,0000000         1,000000         1,0000
Dil Factor         Ratio         Aliquot         Net Equiv         Aliquot         Net Equiv         (ml)           1,0000E+00         1,00000E+00         1,0000	Dil Factor         Ratio         Aliquot         Net Equiv         Aliquot         Water Added           1.0000E+00         1.0000E+00         1.0000E+00         1.0000E         1.00.0000           1.0005E+00         1.0675E+00         1.0675E+00         1.00.0000           1.053E+00         1.053E+00         1.00.0000         1.00.0000           1.0758E+00         1.0972E+00         1.00.0000         1.00.0000           1.166E+00         1.1166E+00         1.1166E+00         1.00.0000           1.0587E+00         1.0587E+00         1.0587E+00         1.00.0000           1.0587E+00         1.0587E+00         1.0580E+00         1.00.0000           1.058E+00         1.058E+00         1.0580E+00         1.00.0000           1.058E+00         1.058E+00         1.0580E+00         1.00.0000           1.058E+00         1.058E+00         1.0580E+00         1.00.0000           1.0774E+00         1.0774E+00         1.0774E+00         1.0774E+00           1.0713E+00         1.0713E+00         1.0713E+00         1.0713E+00
1.0000E+00 1.0005E+00 1.0575E+00 1.0253E+00 1.1768E+00 1.166E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.0358E+00 1.074E+00 1.0774E+00 1.0774E+00 1.0773E+00 1.0773E+00	1.0000E+00 1.0000E+00 1.0675E+00 1.0253E+00 1.1768E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.0358E+00 1.0774E+00 1.0774E+00 1.0773E+00 1.0773E+00
1.0000E+00 1.0675E+00 1.0253E+00 1.1768E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.0358E+00 1.0774E+00 1.0774E+00 1.0774E+00 1.0773E+00 1.0773E+00	1.0000E+00 1.0675E+00 1.0253E+00 1.1768E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.0774E+00 1.0774E+00 1.0773E+00 1.0773E+00 1.0773E+00
1.0675E+00 1.0253E+00 1.1768E+00 1.0972E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.0774E+00 1.0774E+00 1.0773E+00 1.0773E+00	1.0675E+00 1.0253E+00 1.1768E+00 1.0972E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.074E+00 1.074E+00 1.0763E+00 1.0763E+00 1.0713E+00
1.0253E+00 1.1768E+00 1.0972E+00 1.166E+00 1.0587E+00 1.0358E+00 1.0930E+00 1.0774E+00 1.0763E+00 1.0763E+00 1.0763E+00	1.0253E+00 1.1768E+00 1.0972E+00 1.166E+00 1.0358E+00 1.0358E+00 1.0358E+00 1.074E+00 1.074E+00 1.0763E+00 1.0763E+00 1.0713E+00
1.1768E+00 1.0972E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.0358E+00 1.074E+00 1.0763E+00 1.0763E+00 1.0763E+00 1.0763E+00	1.1768E+00 1.0972E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0358E+00 1.074E+00 1.0774E+00 1.0763E+00 1.0763E+00 1.0763E+00 1.0763E+00
1.0972E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0930E+00 1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00	1.0972E+00 1.1166E+00 1.0587E+00 1.0358E+00 1.0930E+00 1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00
1,1166E+00 1,0587E+00 1,0358E+00 1,1454E+00 1,0774E+00 1,0763E+00 1,0763E+00 1,0713E+00	1,1166E+00 1,0587E+00 1,0358E+00 1,1454E+00 1,0774E+00 1,0763E+00 1,0763E+00 1,0713E+00
1.0587E+00 1.0358E+00 1.1454E+00 1.0930E+00 1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00	1.0587E+00 1.0358E+00 1.1454E+00 1.0930E+00 1.0774E+00 1.0763E+00 1.0713E+00
1,0358E+00 1,1454E+00 1,0930E+00 1,0774E+00 1,0763E+00 1,0620E+00 1,0713E+00	1,0358E+00 1,1454E+00 1,0930E+00 1,0774E+00 1,0763E+00 1,0713E+00
1.1454E+00 1.0930E+00 1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00	1.1454E+00 1.0930E+00 1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00
1.0930E+00 1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00	1.0930E+00 1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00
1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00	1.0774E+00 1.0763E+00 1.0620E+00 1.0713E+00
1.0713E+00 1.0620E+00 1.0713E+00	1.0713E+00 1.0620E+00 1.0713E+00
1.0620E+00 1.0713E+00	1.0620E+00 1.0713E+00
1.0713E+00	1.0713E+00

Technician:

AG 11/27/69

Protocol# 1 - h3-cpm-1.lsa

User: Default

Assay Definition-

Assay Description:

H3

Assay Type: CPM Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\Default\h3-cpm-1\20091125\_1337

Raw Results Path: C:\Packard\Tricarb\Results\Default\h3-cpm-1\20091125 1337\20091125

1337.results

Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\h3-cpm-1\20091125\_1337

\0911114 h3a.csv

Assay File Name: C:\Packard\TriCarb\Assays\h3-cpm-1.lsa

Count Conditions -

Nuclide: 3H

Quench Indicator: tSIE

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set: n/a

Count Time (min): 30.00 Count Mode: Normal

Assay Count Cycles: 1 Repeat Sample Count: 1 #Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: Off Low CPM Threshold: Off 2 Sigma % Terminator: Off

Regions LL UL A 0.0 18.6 B 2.0 18.6 C 0.0 0.0

Count Corrections -

Static Controller: On Luminescence Correction: Off Colored Samples: n/a Heterogeneity Monitor: n/a Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions Half Life Units Reference Date Reference Time

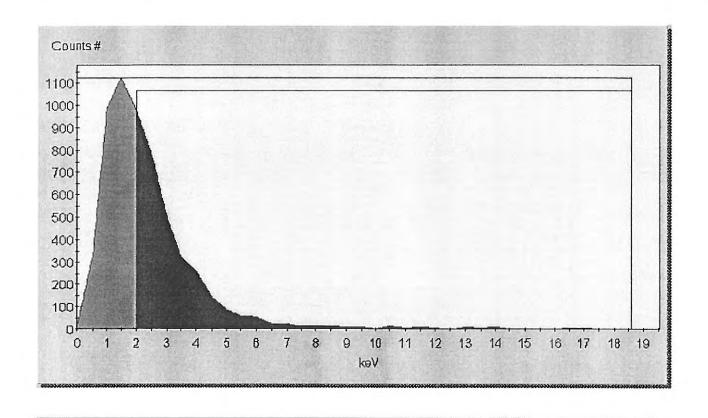
A B C

Cycle 1 Results

SMPL ID P# PID S# CPMA CPMB CPMC tSIE Count TIME Time DATE 09-11114-1-H3-01S 1 195 1 113 0 242.98 1 30.00 11/25/2009 1:37:47 PM

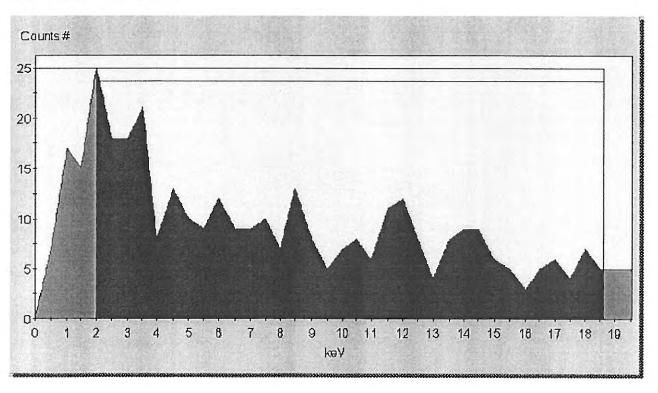
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User: Default



09-11114-1-H3-02S 1 1 2 12 10 0 253.09 30.00 11/25/2009 2:08:51 PM

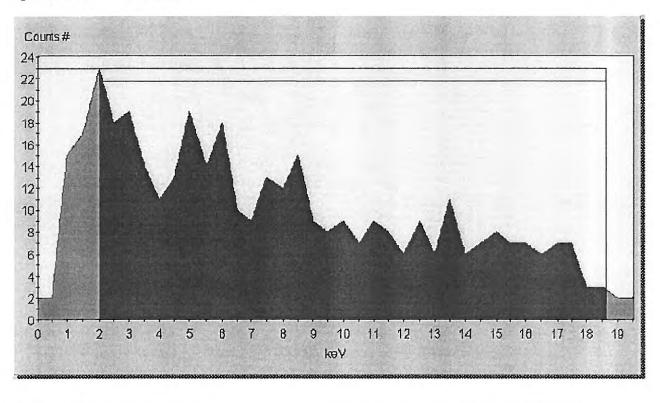
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Page # 3 User: Default

09-11114-1-H3-03S 1 1 3 13 12 0 243.09 30.00 11/25/2009 2:39:36 PM

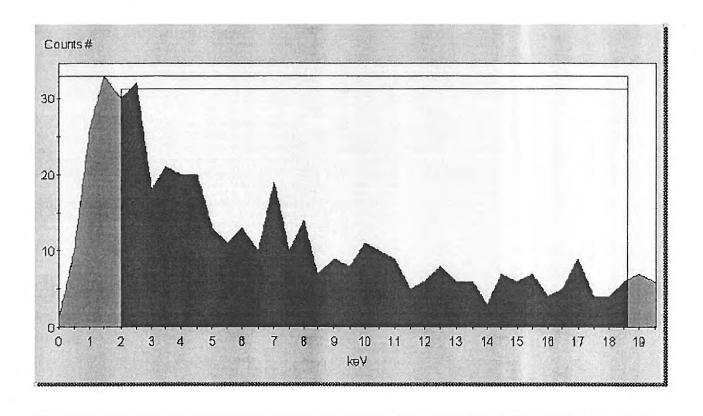
SpectraView Block Data



09-11114-1-H3-04S 1 4 15 12 233.76 0 30.00 11/25/2009 3:10:21 PM

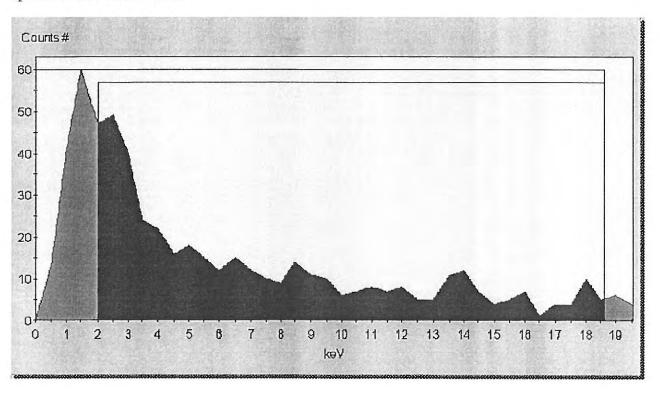
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09-11114-1-H3-05S 1 1 5 18 15 0 238.99 30.00 11/25/2009 3:41:07 PM

SpectraView Block Data



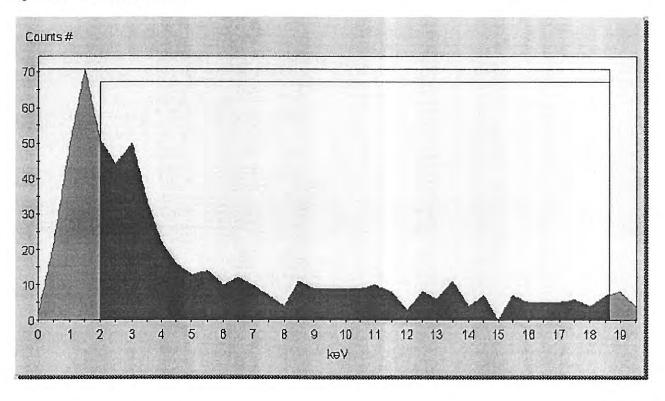
Page # 5

Protocol# 1 - h3-cpm-1.lsa

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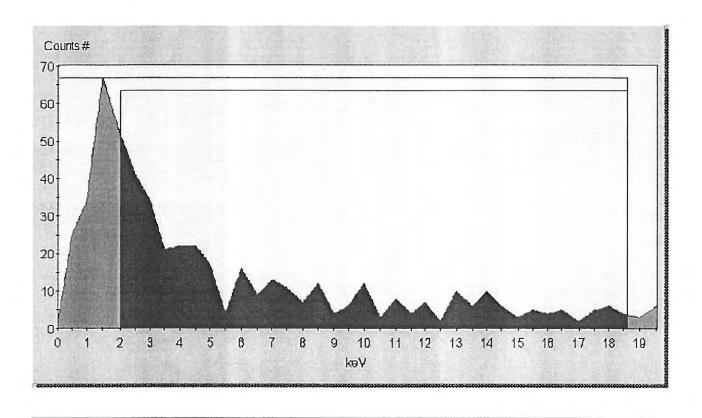
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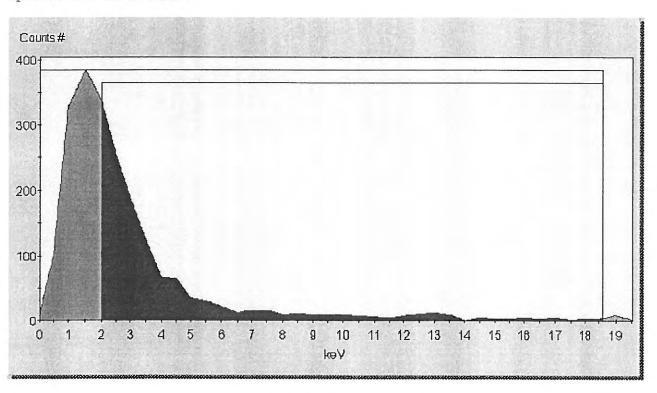
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User: Default



09-11114-1-H3-08S 1 1 8 71 44 0 234.31 30.00 11/25/2009 5:13:20 PM

SpectraView Block Data



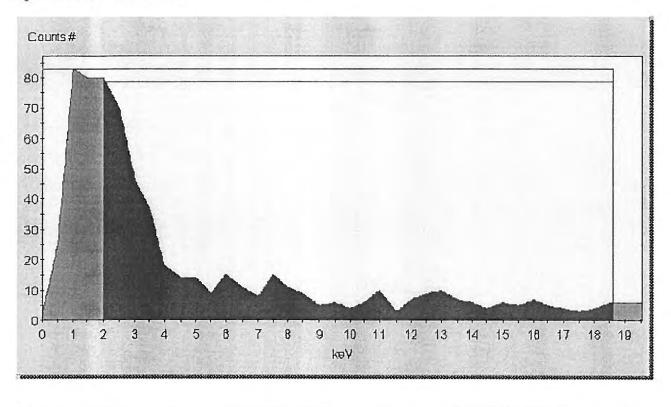
Page # 7

Protocol# 1 - h3-cpm-1.lsa

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SpectraView Block Data



09-11114-1-H3-10S 1 1 10 13 11 0 238.52 30.00 11/25/2009 6:14:51 PM

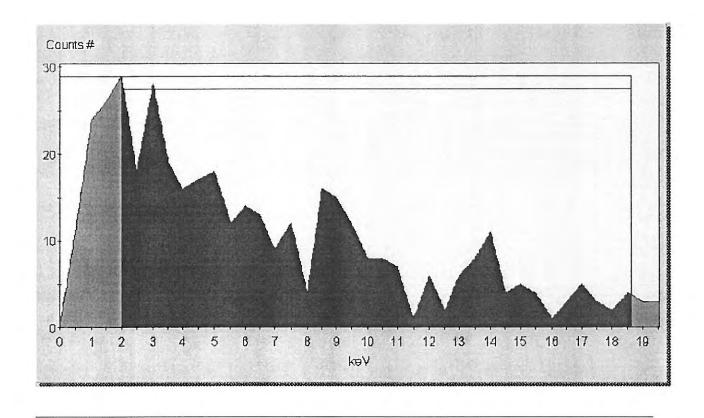
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11/25/2009 9:50:33 PM

Protocol# 1 - h3-cpm-1.lsa

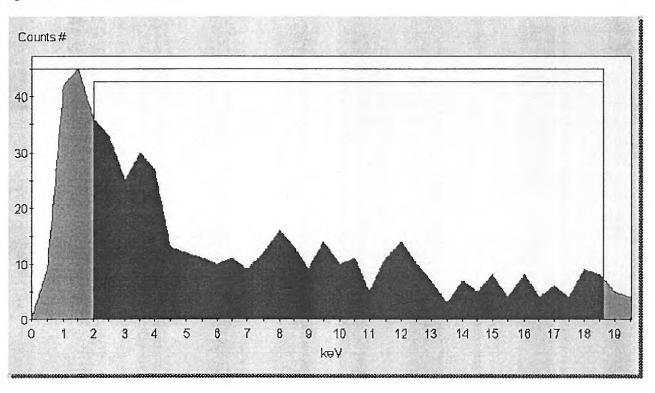
User: Default

Page # 8



14 09-11114-1-H3-11S 1 11 17 234.45 30.00 11/25/2009 6:45:35 PM

SpectraView Block Data



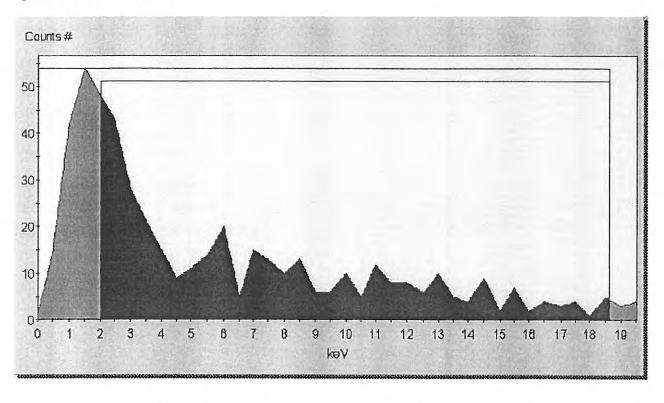
Page # 9

Protocol# 1 - h3-cpm-1.lsa

User: Default

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SpectraView Block Data



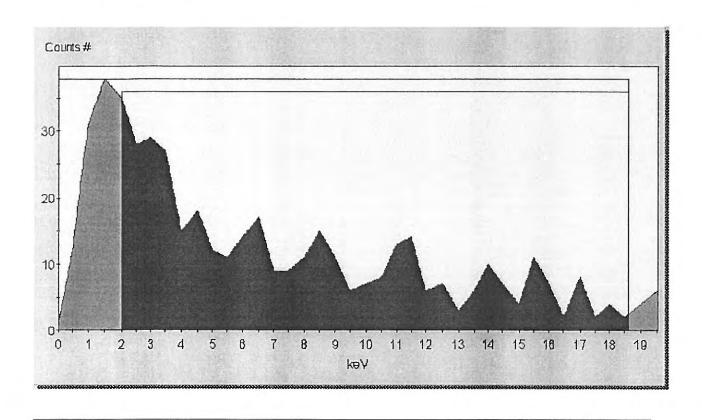
09-11114-1-H3-13S 1 32 13 16 13 0 236.16 30.00 11/25/2009 7:47:08 PM

SpectraView Block Data

Page # 10

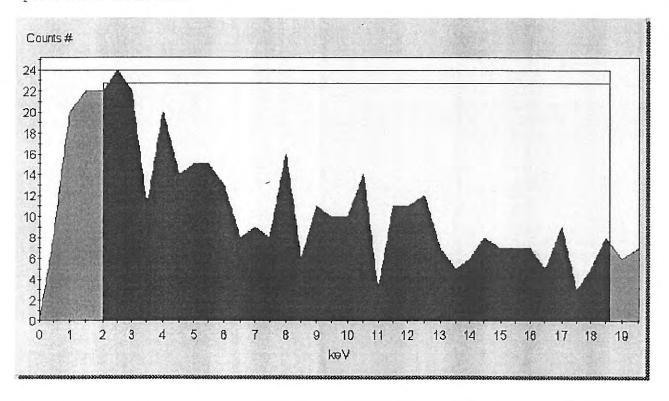
Protocol# 1 - h3-cpm-1.lsa

User: Default



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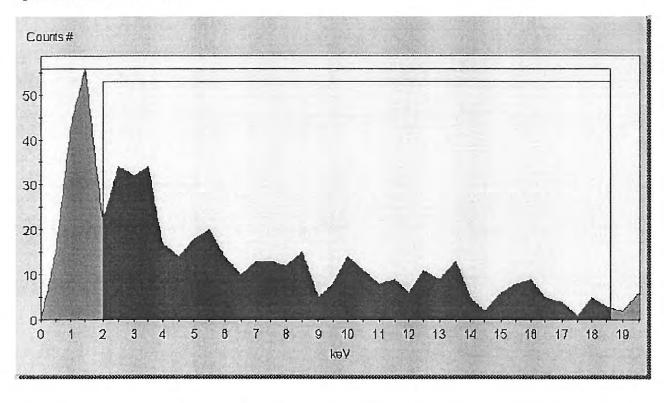
SpectraView Block Data



Page # 11 User: Default Protocol# 1 - h3-cpm-1.lsa

09-11114-1-H3-15S 1 32 15 17 14 0 231.74 30.00 11/25/2009 8:48:37 PM

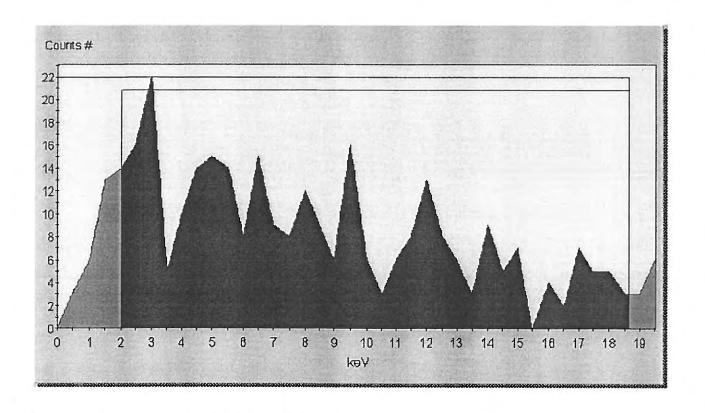
SpectraView Block Data



Sample #16 1 32 16 10 10 274.00 30.00 11/25/2009 9:19:21 PM

SpectraView Block Data

User: Default



SNC Protocol

AG 11/25/09

Calibration Information Software Version IC: 2.11 Software Version EC: 2.02 Instrument Model: Tri-Carb 3100TR Instrument Serial Number: 426825 3H Chi Square: 9.44 Date Processed: 11/25/2009 8:02:05 AM 14C Chi Square: 10.63 Date Processed: 11/25/2009 8:02:05 AM 3H E^2/B (1-18.6 keV): 289.95 Date Processed: 11/25/2009 8:02:05 AM 14C E^2/B (4-156 keV): 536.77 Date Processed: 11/25/2009 8:02:05 AM 3H Efficiency (0-18.6 keV): 63.89 Date Processed: 11/25/2009 8:02:05 AM 14C Efficiency (0-156 keV): 96.22 Date Processed: 11/25/2009 8:02:05 AM IPA Background Date Processed: 11/25/2009 8:02:05 AM 3H Background CPM (0-18.6 keV): 13.98 Date Processed: 11/25/2009 8:02:05 AM 14C Background CPM (0-156 keV): 20.92 Date Processed: 11/25/2009 8:02:05 AM 3H Calibration DPM: 183600 3H Reference Date: 2/27/2007 14C Calibration DPM: 136900

## SECTION IX ANALYTICAL DATA (CARBON-14)

09-11114 C0014 Run 1

Eberline Services Oak Ridge Laboratory Analysis Sheet

Work Order	7777 00	Internal	Sample	Client	Login	Sample	Sample
anio viola	411114	Fraction	Desc	QI .	CPM	Date	Aliquot
Analysis Code	C0014	10	rcs	SOT		11/25/09 00:00	1.0000E+00
Run	1	02	MBL	BLANK		11/25/09 00:00	1.0000E+00
Date Received	11/25/2009	03	DUP	ES-SU009-S-15	44	11/24/09 07:00	1.0675E+00
Lab Deadline	11/30/2009	40	00	ES-SU009-S-15	44	11/24/09 07:00	1.0253E+00
Client	Energy Solutions, LLC	05	TRG	ES-SU009-S-18	49	11/24/09 07:10	1.1768E+00
Project	ENV	90	TRG	ES-SU009-S-21	36	11/24/09 07:15	1.0972E+00
Report Level	4	20	TRG	ES-B-S-1	43	11/24/09 07:20	1.1166E+00
Activity Units	pCi	80	TRG	ES-B-S-2	56	11/24/09 07:25	1.0587E+00
Aliquot Units	ත	60	TRG	ES-B-S-3	49	11/24/09 07:30	1.0358E+00
Matrix	so	10	TRG	ES-B-S-4	45	11/24/09 07:40	1.1454E+00
Method	EPA 520.0 Modified	7	TRG	ES-B-S-5	41	11/24/09 07:45	1.0930E+00
Instrument Type	Beta LSC	12	TRG	ES-B-S-6	40	11/24/09 08:00	1.0774E+00
Radiometric Tracer		13	TRG	ES-B-S-7	31	11/24/09 08:10	1.0763E+00
Radiometric Sol#		14	TRG	ES-B-S-8	53	11/24/09 08:15	1.0620E+00
Tracer Act (dpm/g)		15	TRG	ES-8-S-9	42	11/24/09 08:30	1.0713E+00
Carrier							Ve poor purious and purious an
Carrier Conc (mg/ml)							

\* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. \*\* Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Printed: 11/25/2009 11:39 AM Page 2 of 3

09-11114

Eberline Services Oak Ridge Laboratory Analysis Sheet

C0014 Run 1

SAF 2\* SAF 1\* Mean % Rec Grav % Rec Grav Filter Net (g) Grav Filter Final (g) Grav Filter Tare (g) Grav Carrier Added (ml) Radiometric % Rec 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Radiometric Tracer (pCi) Tracer Total ACT (dpm) Tracer Aliquot (g) Sample Desc TRG TRG DUP TRG TRG TRG TRG TRG TRG TRG TRG **LCS** MBL TRG 00 Internal Fraction 5 02 03 9 05 90 07 08 60 10 7 12 13 14 15

\* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. \*\* Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Printed: 11/25/2009 11:39 AM Page 3 of 3

09-11114

Oak Ridge Laboratory Analysis Sheet

**Eberline Services** 

C0014 Run 1

Sep t1 By Sep t1 Date/Time Sep to By Sep t0 Date/Time **JPACHELLA** JPACHELLA JPACHELLA JPACHELLA **JPACHELLA JPACHELLA** JPACHELLA JPACHELLA JPACHELLA **JPACHELLA JPACHELLA JPACHELLA** JPACHELLA JPACHELLA JPACHELLA Prep 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 11/25/09 10:55 Prep Date Rough Prep By Rough Prep Date Sample DUP TRG TRG TRG TRG TRG TRG TRG TRG TRG TRG TRG **LCS** MBL 00 Internal Fraction 5 14 5 02 03 04 05 90 08 60 10 7 12 5 07

\* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. \*\* Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

# Preliminary Data Report & Analytical Calculations Work Order: 09-11114-C0014-1

Blank Flag		ş															
MDA	Š	9 X	ş	Š	š	ŏ	Ş	ş	ş	ş	ş	ě	Š	ş	ş		
RPD Flag		i.	N/														
LCS	ŏ																
LCS %R	105.36																
LCS Known	3.65E+02																
MDA	2.69E+00	2.68E+00	2.53E+00	2.66E+00	2.26E+00	2.45E+00	2.45E+00	2.52E+00	2.58E+00	2.36E+00	2.44E+00	2.47E+00	2.50E+00	2.54E+00	2.52E+00		
Error Estimate	5.85E+00	1.58E+00	1.44E+00	1.53E+00	1.27E+00	1,53E+00	1.96E+00	1.43E+00	1.44E+00	1.31E+00	1.36E+00	1.48E+00	1.44E+00	1.40E+00	1.44E+00		
Results	3.84E+02	6.43E-01	-1.22E+00	-6.38E-01	-1.62E+00	4.11E+00	2.40E+01	-1.21E+00	-2.48E+00	-2.27E+00	-2.34E+00	1.77E+00	-5.99E-01	-3.04E+00	-1.21E+00		
Activity Units	pCI/g	bCi/g	pCi/g	pCI/g	pCI/g	pCI/g	pCI/g	pCI/g	pCi/g	pCi/g	pCI/g	pCi/g	pCI/g	pCI/g	bCI/g		
Cilent	SOT	BLANK	ES-SU009-S-15	ES-SU009-S-15	ES-SU009-S-18	ES-SU009-S-21	ES-B-S-1	ES-B-S-2	ES-B-S-3	ES-B-S-4	ES-B-S-5	ES-B-S-6	ES-B-S-7	ES-B-S-8	ES-B-S-9		
Sample	rcs	MBL	ana	00	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG	TRG		
Nuclide	C-14	C-14	C-14	C-14	C-14	C-14	C-14	C-14	C-14	C-14	C-14	C-14	C-14	41-7	C-14		
Fraction	20	02	03	04	05	90	20	80	60	10	11	12	13	14	15		

9,10	L	C0014	<b>ÞIIII-60</b>	Energy Solutions, LLC
	Run	Analysis Code	Eberline Services Work Order	Client

## Sep t1 Date/Time Sep to Date/Time SAF 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Mean % Rec 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Grav % Rec 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 000 Radiometric % Rec 1.03E+00 1.10E+00 1.08E+00 1.00E+00 1.00E+00 1.07E+00 1.18E+00 1.12E+00 1.04E+00 1.09E+00 1.06E+00 1.15E+00 1.08E+00 1.06E+00 1.07E+00 Sample 11/25/09 00:00 11/25/09 00:00 11/24/09 07:00 11/24/09 07:00 11/24/09 07:10 11/24/09 07:15 11/24/09 07:20 11/24/09 07:30 11/24/09 07:45 11/24/09 07:25 11/24/09 07:40 11/24/09 08:00 11/24/09 08:10 11/24/09 08:15 11/24/09 08:30 Sample Date Sample CCS MBL DUP TRG TRG TRG TRG TRG TRG TRG TRG TRG TRG TRG 8 Nucilde C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 Lab Fraction 04 90 90 60 01 02 8 12 14 13 07 80 9 7 13

9,19	L	C0014	<b>ÞIIII-60</b>	Energy Solutions, LLC
9	Run	Analysis Code	Eberline Services Work Order	Client

900

Run

## 23 0.654272775 23 0.649146575 23 0.643124465 23 0.652831467 23 0.653171734 23 0.64276374 23 0.656202759 23 0.657300062 23 0.660774143 23 0.653171734 0.649268389 23 0.658422771 23 0.649024674 23 0.650964674 23 0.6611141 Eff Bkg 1920 18570 720 099 900 630 900 630 570 780 570 570 999 540 630 Counts 30 30 30 30 30 30 30 30 8 30 33 30 30 30 30 Count Carrier 10 12 2 4 15 2 3 4 49 9 1 6 F 00 3100B 3100B 3100B 3100B 3100B 3100B 3100B 3100B 3100B 3100B 3100B 3100B 3100B 3100B Detect 3100B 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 2092882.5 Haifilfe (days) 11/25/09 13:30 11/25/09 14:02 11/25/09 14:35 11/25/09 16:12 11/25/09 17:49 11/25/09 15:39 11/25/09 16:44 11/25/09 17:17 11/25/09 19:59 11/25/09 15:07 11/25/09 18:54 11/25/09 19:26 11/25/09 20:31 11/25/09 21:04 11/25/09 18:21 Counting Date/Time Sample rcs MBL DUP TRG TRG TRG TRG TRG TRG TRG TRG TRG TRG TRG 00 Nuclide C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 C-14 Lab 03 04 05 60 02 90 07 80 9 7 7 5 15 5 14

Energy Solutions, LLC

Client

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Eberline Services Work Order

C0014

Analysis Code

## 09-11114-C0014-1 (pCi/g) in SO Tracer ID;

Count Room Report Client: Energy Solutions, LLC

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	SOT	SOT	11/25/09 00:00	1.0000				0.00		
02	MBL	BLANK	11/25/09 00:00	1.0000				0.00		
03	DUP	ES-SU009-S-15	11/24/09 07:00	1.0675				0.00		
04	DO	ES-SU009-S-15	11/24/09 07:00	1.0253				00.00		
05	TRG	ES-SU009-S-18	11/24/09 07:10	1.1768				0.00		
90	TRG	ES-SU009-S-21	11/24/09 07:15	1.0972				0.00		
20	TRG	ES-B-S-1	11/24/09 07:20	1.1166				00.00		
80	TRG	ES-B-S-2	11/24/09 07:25	1.0587				0.00		
60	TRG	ES-B-S-3	11/24/09 07:30	1.0358				0.00		
10	TRG	ES-B-S-4	11/24/09 07:40	1.1454				0.00		
11	TRG	ES-B-S-5	11/24/09 07:45	1.0930				0.00		
12	TRG	ES-B-S-6	11/24/09 08:00	1.0774				0.00		
13	TRG	ES-B-S-7	11/24/09 08:10	1.0763				0.00		
14	TRG	ES-B-S-8	11/24/09 08:15	1.0620	One of the other o			00.00		
15	TRG	ES-B-S-9	11/24/09 08:30	1.0713				00:00		

Eberline Services Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 11/25/2009 10:55 AM

nitials			Error Estimate	0.000	$\  \ $		
Witness Initials		MSD	Added	00.00			
n Initials		000	Estimate	0.000		SOT	Matrix Spike
Technician Initials	And	CSD	Known	00.00			Σ.
1	<i>J</i>	S	Error Estimate		Balance Printer Tapes		
cian	ELLA	MS	Added	350.02	nce Prin		
Technician	JPACHELLA	S	Error Estimate	10.214	Balar		
		SOT	Known	364.78		Tracer	
9	9 10:50	MSD	Volume Used (g)				
Date	11/25/2009 10:50	CSD	Volume Used (g)				
Code	14	MS	Volume Used (g)	0.2512		Approx Addition	
Analysis Code	C0014	SOT	Volume Used (g)	0.2618		Volume Used (g)	
Kun	~		Approx Addition	1.030		Solution Date	
		kes	ution afe	11/25/2009	Tracers	Activity dpm/g	
ork Order	114	LCS & Matrix Spikes	Activity dpm/g	3093,286		# /oS	
Internal Work Order	09-11114	LCS &	# /oS	C-3a		Isotope	
			Isotope	C-14		fraction	

969

## Aliquot Worksheet

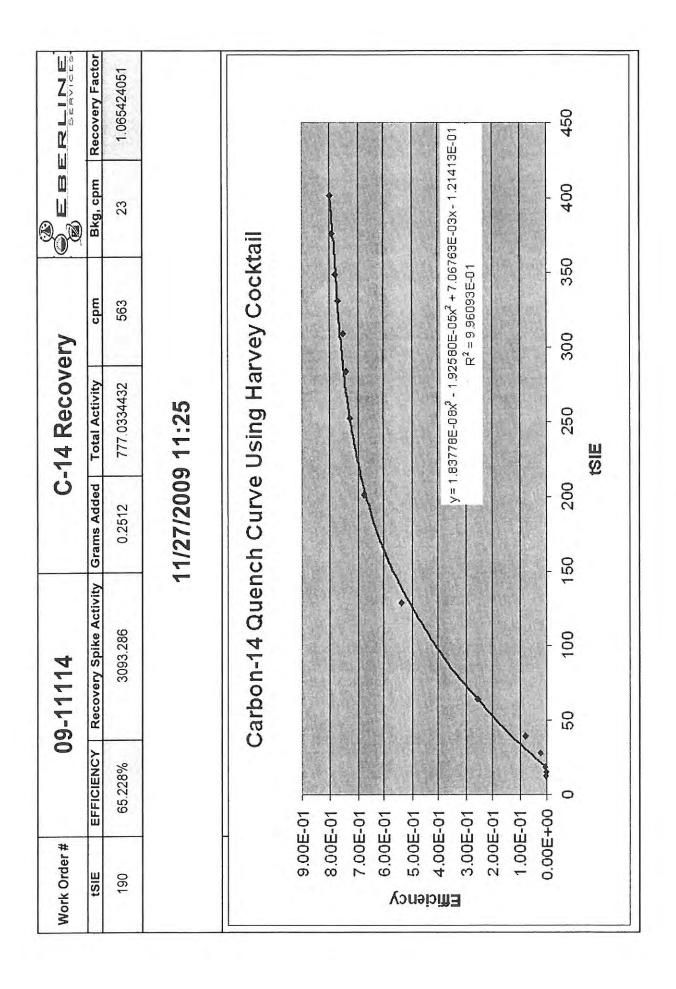
Eberline Analytical Oak Ridge Laboratory

	Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	dline			Leci	Technician		
	09-11114	~	C0014	grams	11/30/2009	5009			JPAC	JPACHELLA		
	Energy Solutions, LLC	Sample	Muffle Data		Dilution Data		Aliquot Data	t Data	MS Aliqu	MS Aliquot Data	H-3 Soli	H-3 Solids Only
Fraction	Client ID	Type	Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
10	TCS	rcs					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	ES-SU009-S-15	DUP					1.0675E+00	1.0675E+00				
04	ES-SU009-S-15	00					1.0253E+00	1.0253E+00				
05	ES-SU009-S-18	TRG					1.1768E+00	1.1768E+00				
90	ES-SU009-S-21	TRG					1.0972E+00	1.0972E+00				
20	ES-B-S-1	TRG					1.1166E+00	1.1166E+00				
80	ES-B-S-2	TRG					1.0587E+00	1.0587E+00				
60	ES-B-S-3	TRG					1.0358E+00	1.0358E+00				
10	ES-B-S-4	TRG					1.1454E+00	1.1454E+00				
7	ES-B-S-5	TRG					1.0930E+00	1.0930E+00				
12	ES-B-S-6	TRG					1.0774E+00	1.0774E+00				
13	ES-B-S-7	TRG					1.0763E+00	1.0763E+00				
14	ES-B-S-8	TRG					1.0620E+00	1.0620E+00				
15	ES-B-S-9	TRG					1.0713E+00	1.0713E+00				

978

Technician:

Comments



Protocol# 6 - Cl4 cpm.6.lsa

User: Default

11/51/69 (B)

Assay Definition-

Assay Description:

C14

Assay Type: CPM Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\Default\C14\_cpm.6\20091125 1328

Raw Results Path: C:\Packard\Tricarb\Results\Default\C14\_cpm.6\20091125\_1328\20091125\_

1328.results

Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\C14\_cpm.6\20091125\_1328

\0911114 ac14.csv

Assay File Name: C:\Packard\TriCarb\Assays\C14\_cpm.6.lsa

Count Conditions-

Nuclide: 14C

Quench Indicator: tSIE

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 1.00

Quench Set: n/a

Count Time (min): 30.00

Count Mode: Normal

Assay Count Cycles: 1 Repeat Sample Count: 1 #Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: Off Low CPM Threshold: Off 2 Sigma % Terminator: Off

Regions LL UL A 0.0 156.0 B 4.0 156.0 C 0.0 0.0

Count Corrections-

Static Controller: On Luminescence Correction: Off Colored Samples: n/a Heterogeneity Monitor: n/a Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions Half Life Units Reference Date Reference Time

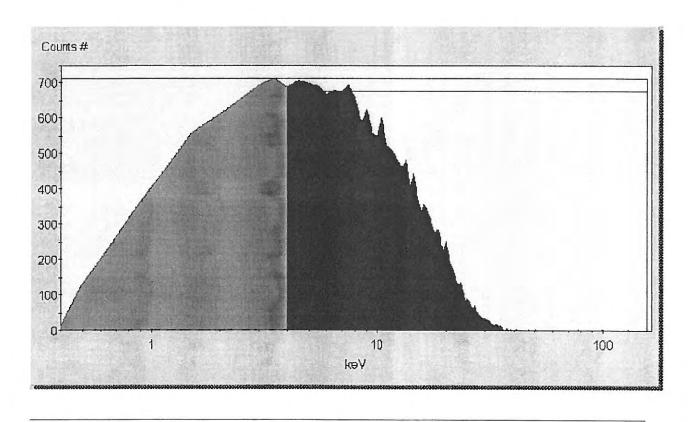
A B

C

Cycle 1 Results

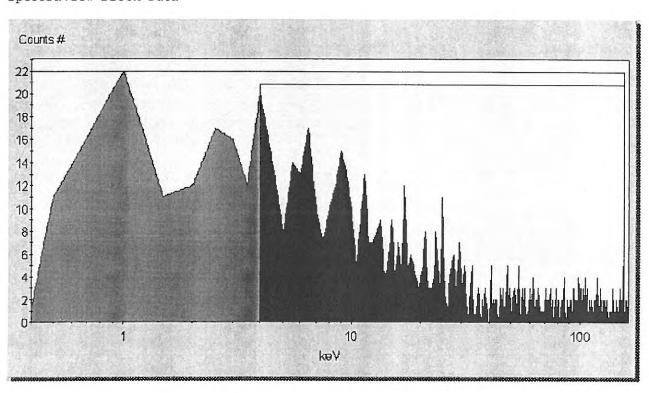
SMPL\_ID PID S# CPMA CPMB CPMC tSIE Count Time DATE TIME 09-11114-1-C14-01S 20 6 1 745 619 0 191.20 30.00 11/25/2009 1:30:14 PM

Protocol# 6 - C14\_cpm.6.lsa



09-11114-1-C14-02S 20 2 28 24 0 192.05 30.00 11/25/2009 2:02:38 PM

SpectraView Block Data

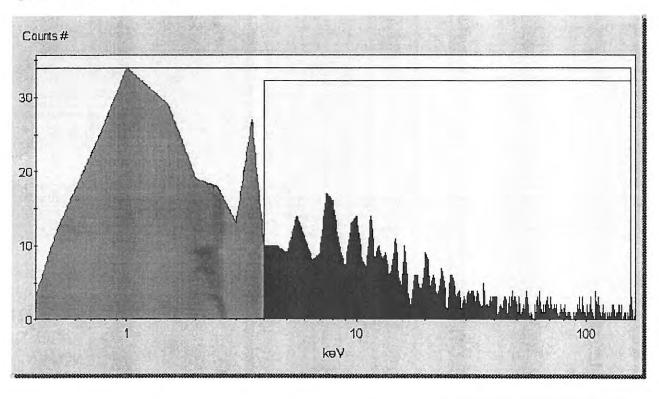


Protocol# 6 - C14 cpm.6.lsa

User: Default

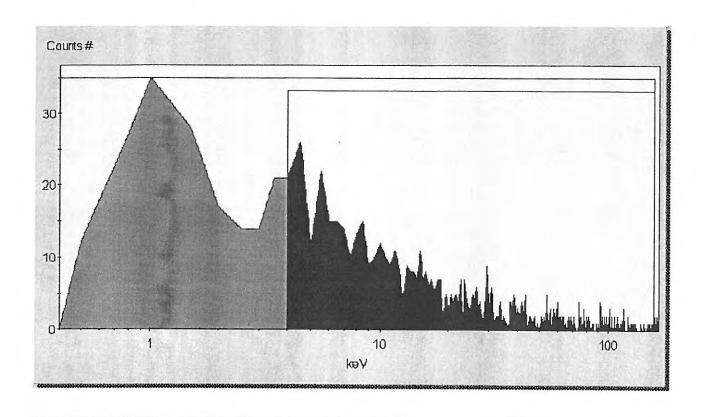
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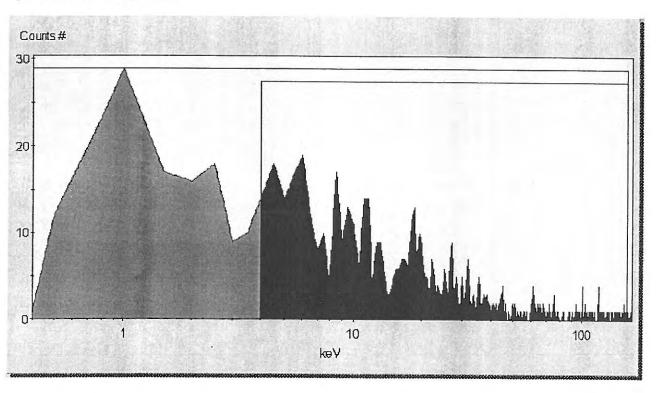
09-11114-1-C14-04S 6 20 4 26 22 0 185.66 30.00 11/25/2009 3:07:28 PM

Protocol# 6 - C14\_cpm.6.lsa



09-11114-1-C14-05S 6 20 5 24 20 0 196.19 30.00 11/25/2009 3:39:53 PM

SpectraView Block Data

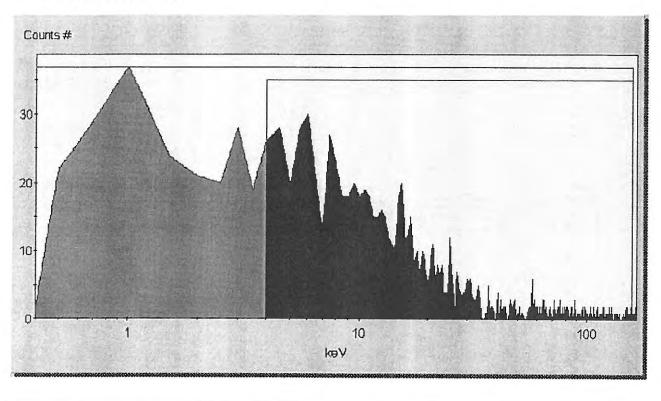


Protocol# 6 - C14\_cpm.6.lsa

User: Default

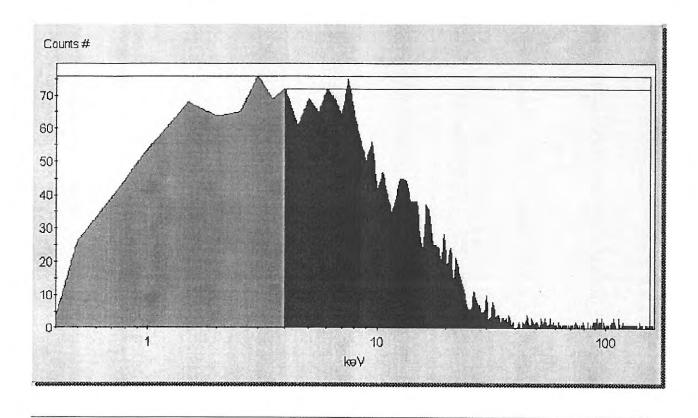
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SpectraView Block Data



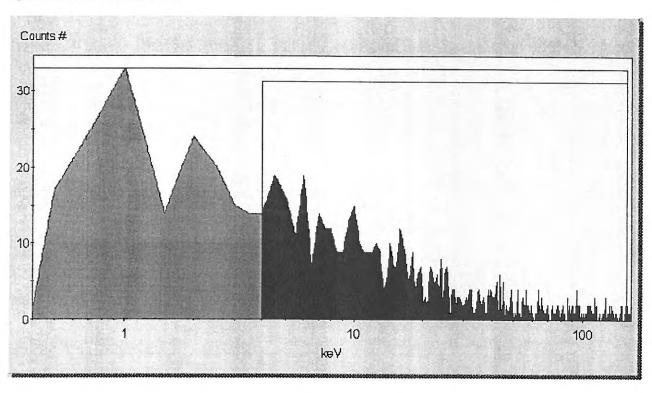
09-11114-1-C14-07S 6 20 7 78 64 0 185.46 30.00 11/25/2009 4:44:43 PM

Protocol# 6 - C14\_cpm.6.lsa



09-11114-1-C14-08S 20 8 26 21 194.54 0 30.00 11/25/2009 5:17:07 PM

SpectraView Block Data

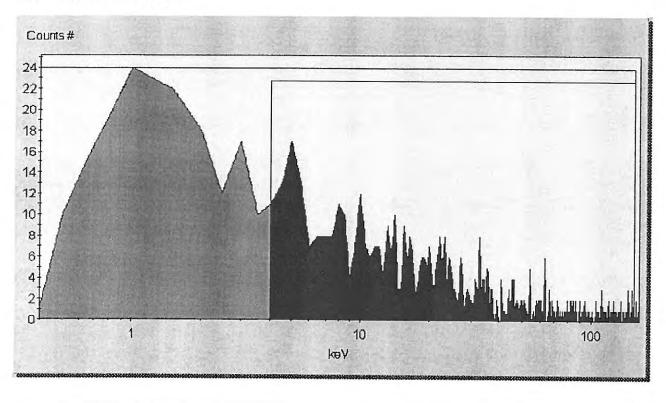


Protocol# 6 - C14\_cpm.6.lsa

User: Default

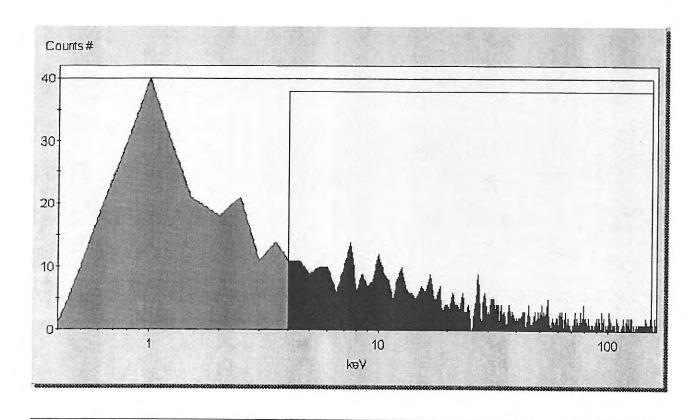
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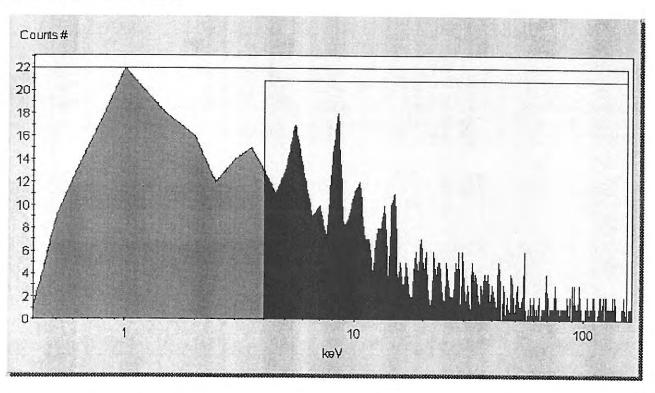
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Protocol# 6 - C14\_cpm.6.lsa



09-11114-1-C14-11S 6 20 11 22 19 0 193.86 30.00 11/25/2009 6:54:21 PM

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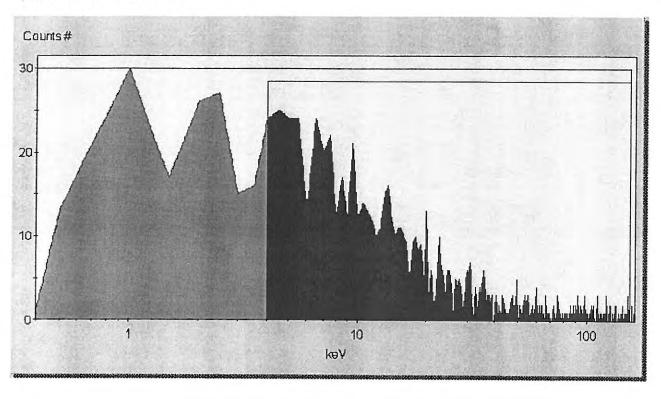
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User: Default

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30.00

SpectraView Block Data

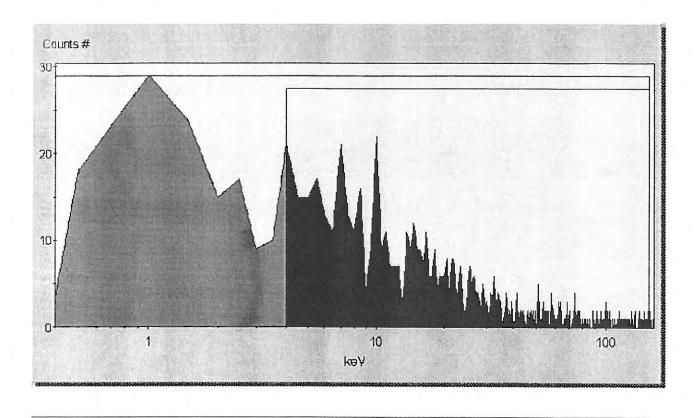


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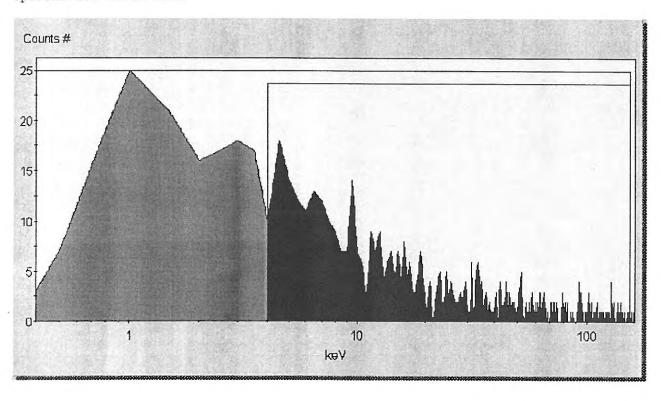
User: Default

Page # 10



09-11114-1-C14-14S 6 37 14 22 18 0 190.11 30.00 11/25/2009 8:31:40 PM

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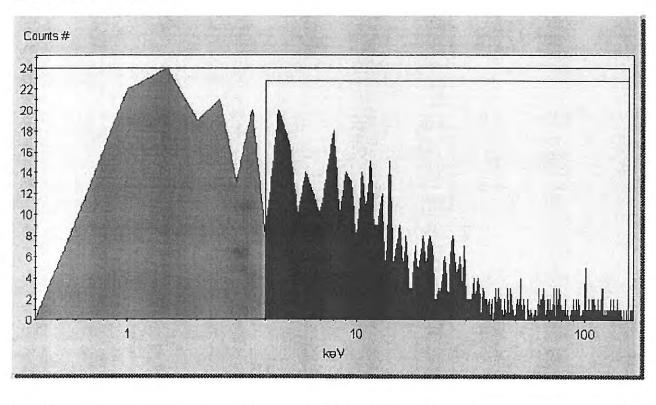


Protocol# 6 - C14 cpm.6.lsa

User: Default

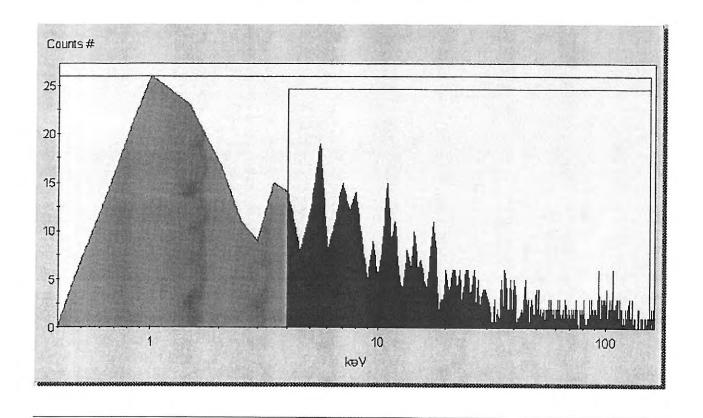
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SpectraView Block Data



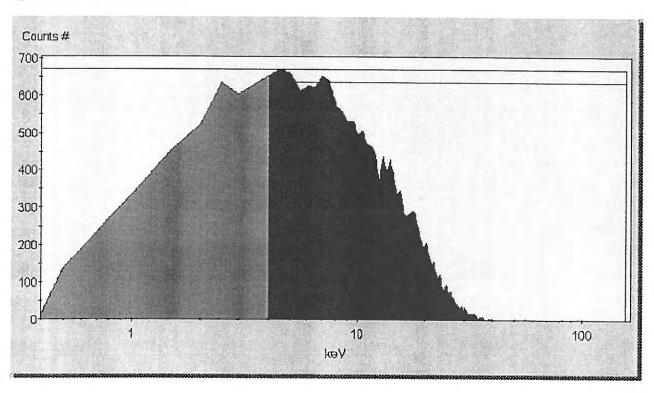
Sample #16 6 37 16 26 23 0 195.18 30.00 11/25/2009 9:36:30 PM

Protocol# 6 - C14\_cpm.6.lsa



Sample #17 6 37 17 674 563 0 190.00 30.00 11/25/2009 10:08:54 PM

SpectraView Block Data



SNC Protocol



Calibration Information Software Version IC: 2.12 Software Version EC: 2.02 Instrument Model: Tri-Carb 3100TR Instrument Serial Number: 427086 3H Chi Square: 25.88 Date Processed: 11/25/2009 8:07:03 AM 14C Chi Square: 13.52 Date Processed: 11/25/2009 8:07:03 AM 3H E^2/B (1-18.6 keV): 278.48 Date Processed: 11/25/2009 8:07:03 AM 14C E^2/B (4-156 keV): 549.61 Date Processed: 11/25/2009 8:07:03 AM 3H Efficiency (0-18.6 keV): 63.54 Date Processed: 11/25/2009 8:07:03 AM 14C Efficiency (0-156 keV): 95.97 Date Processed: 11/25/2009 8:07:03 AM IPA Background Date Processed: 11/25/2009 8:07:03 AM 3H Background CPM (0-18.6 keV): 14.55 Date Processed: 11/25/2009 8:07:03 AM 14C Background CPM (0-156 keV): 21.13 Date Processed: 11/25/2009 8:07:03 AM 3H Calibration DPM: 207400 3H Reference Date: 10/29/2007 14C Calibration DPM: 120521